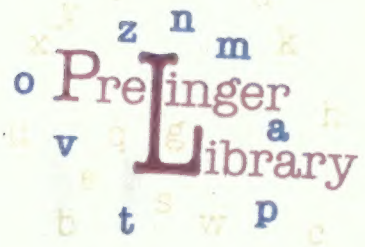
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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each subject. In addition, a geographical reference is published wherever the article relates to any particular railway company. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the name of the electric railway to which the article refers. Groupings are made under the names of the city in which the main office of the company is located, and cross references are given for the names of the railways, which appear in alphabetical order. An exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the more common keywords used in the index. This list has been subdivided for convenience into sixteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index. As an example, if a reader wished to locate an article on power-driven motor trucks he would obviously look in the list under the general subject "vehicles," and of the four keywords that appear under this only "Commercial Vehicles" could apply to the article in question. The reader would therefore refer to this keyword under "C" in the body of the index.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND LEGAL

Accidents (including wrecks)
Accident claim department
Legislation
Legal
Public service commissions
Public service corporations

CARS

Car design
Cars (descriptive)
Cleaning of cars
Gasoline cars
Lubrication
Heating of cars
Lighting of cars
Storage battery cars
Tower cars
Ventilation of cars
Work cars
Wrecking cars

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Controllers and wiring
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Current-collection
Fenders and wheel guards
Gears and pinions
Headlights
Journals
Motors
Trucks, car
Wheels

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Strikes

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Through routes and joint rates
Tickets
Transfers

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Appraisal of railway property
Financial
Franchises
Maps
Operating records and costs
Statistics
Traffic investigations, cities

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High tension d.c. railways
Interurban railways
Locomotives
Single-phase railways

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Inspection of cars
Maintenance records and costs
Paints and painting
Repair shop equipment
Repair shop practice
Repair shops
Tests of equipment
Washing of cars
Welding, special methods

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Multiple-unit trains
Operating records and costs
Passenger handling records
Rules
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Stopping of cars
Telephones
Trailer operation
Yards

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Converters
Energy consumption
Overhead construction
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Power generation
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Substations
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Trolley wire
Turbo-generators and equipment

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Operating records and costs
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Repair shops
Terminal stations and terminals
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Track maintenance

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Publicity
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Organiation charts
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Standardization
Storerooms
Timber preservation

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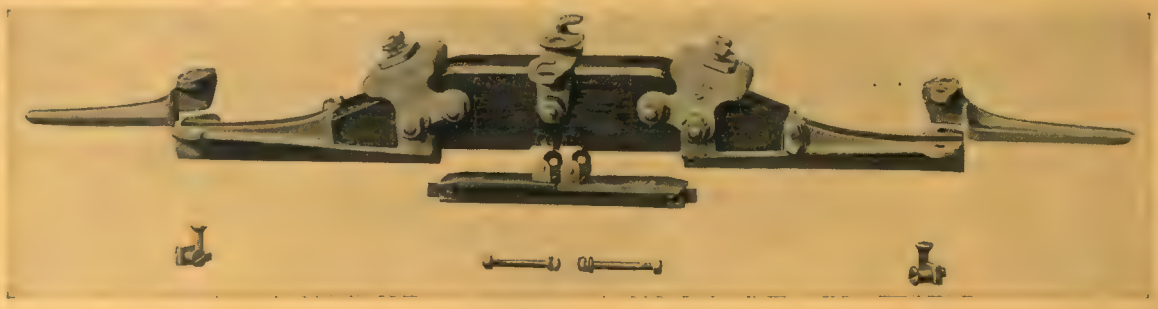
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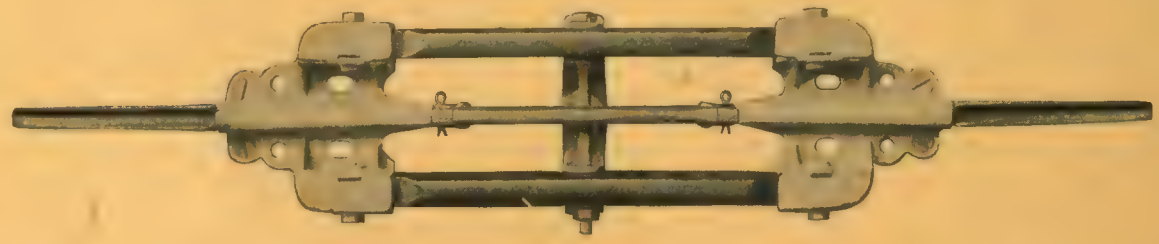
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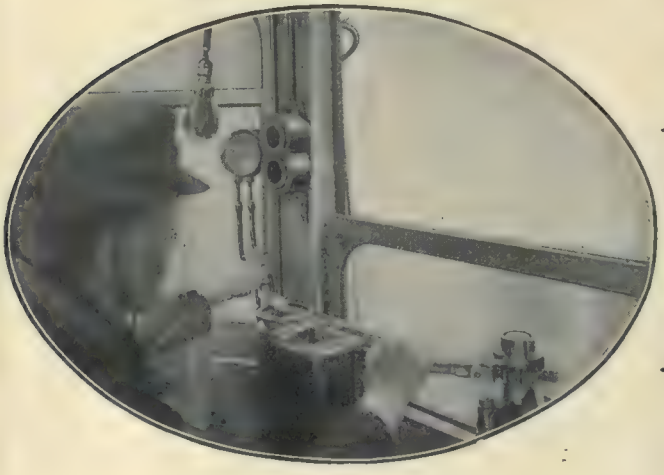
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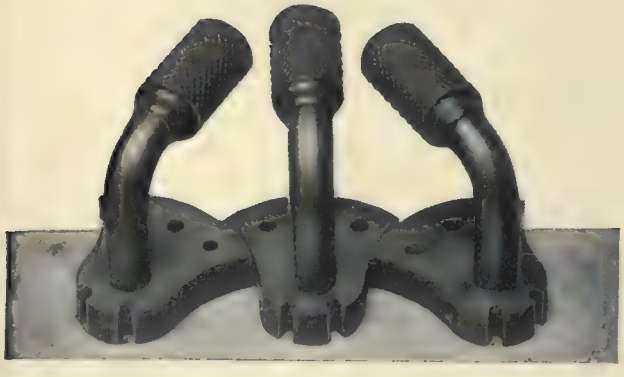


←Location of Trains Automatically Displayed Direct to Dispatcher



←Continuous Display of Signals in Motorman's Cab

←Direct Communication from Dispatcher to Motorman



←Signal Indications Automatically Interlocked Against Error

THE SIMMEN SYSTEM

P. J. Simmen, Buffalo

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.
TORONTO

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
BUFFALO



Track and Weather Conditions will soon be Treacherous

making it harder for the motormen to stop the car in emergencies,
—making it more inviting for the conductor to take a chance in not throwing the hand signals,
—making it more uncomfortable for passengers to suffer the delays occasioned by no signaling or signaling dependent upon the "human element,"
—putting the operation of some automatic signals against that crucial test—severe weather.

An installation **NOW** of United States Automatic Electric Signals will eliminate the cause of making emergency stops to prevent collision,
—will eliminate the need of taking chances,
—will eliminate the traffic delays occasioned by manual signals,
—will remove all question of proper operation of signals in bad weather,
—and, what is equally desirable, will save your road good money.

We will co-operate with you in paving the way for a perfect traffic system.

Write for our proposition.

United States Electric Signal Co.

West Newton, Mass.



Reduce Your Maintenance Forces Put a BROWNHOIST at Work

Did you ever calculate how much saving a Brownhoist Work-Car Crane would make on your roadway and construction costs? Ask the companies who are using the Brownhoist Crane.

The upper picture shows the Pittsburg Railway Co. Crane fitted with a hook block for handling dump buckets, rails, ties, cross-overs, poles, timbers and other construction material.

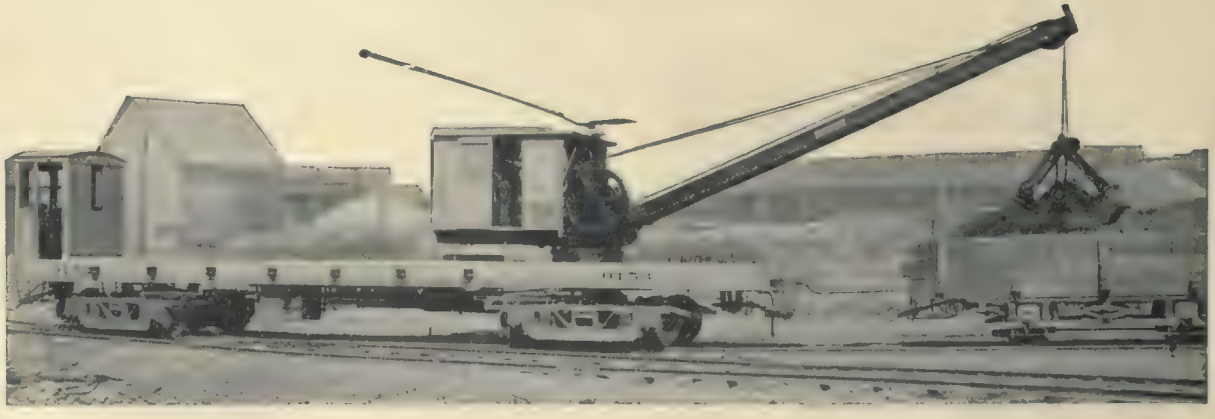
The Cleveland Railway Co. has two of these Brownhoist Cranes. The one below, which is shown with the grab bucket, has proven economical in handling sand, gravel, crushed stone, cinders, coal, etc.

And the Brownhoist WORK-CAR CRANE handles its own work trains, being self-propelling.

Send for catalogue "I," which shows how and where some of these cranes are used.

The Brown Hoisting Machinery Company

Cleveland, Ohio



9618



TOUGHNESS

in Phono-Electric Wire

Phono-Electric

TOUGHNESS in trolley wire is a quality not defined by either tensile strength or elasticity, but—a power to resist bending, kinking, wrenching, sudden blows or slow distortions, without giving way.

"Phono-Electric" *is a tough wire, and it is a wire that'll give long Service Life.*

It is a wire you can absolutely depend upon—does not rely upon a hardened skin for its strength. It is uniform throughout its cross-section.

No matter what your requirements may be—Catenary, Cross-Span or Bracket Construction—no matter how severe the service—***"Phono-Electric"*** a strong, tough wire, will save money on that service giving several times the life of hard-drawn copper. Put up a test section—make comparisons.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front St., New York, U. S. A.

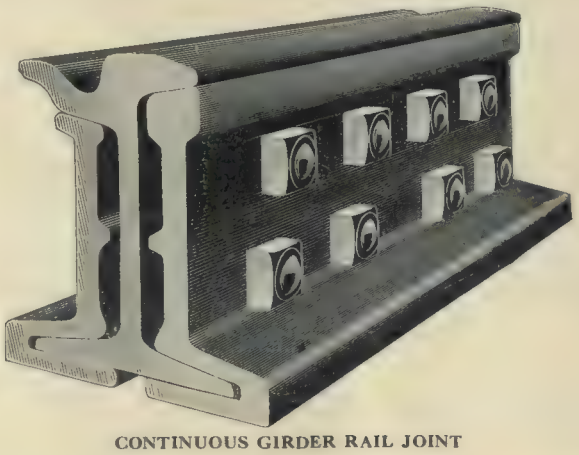
Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England

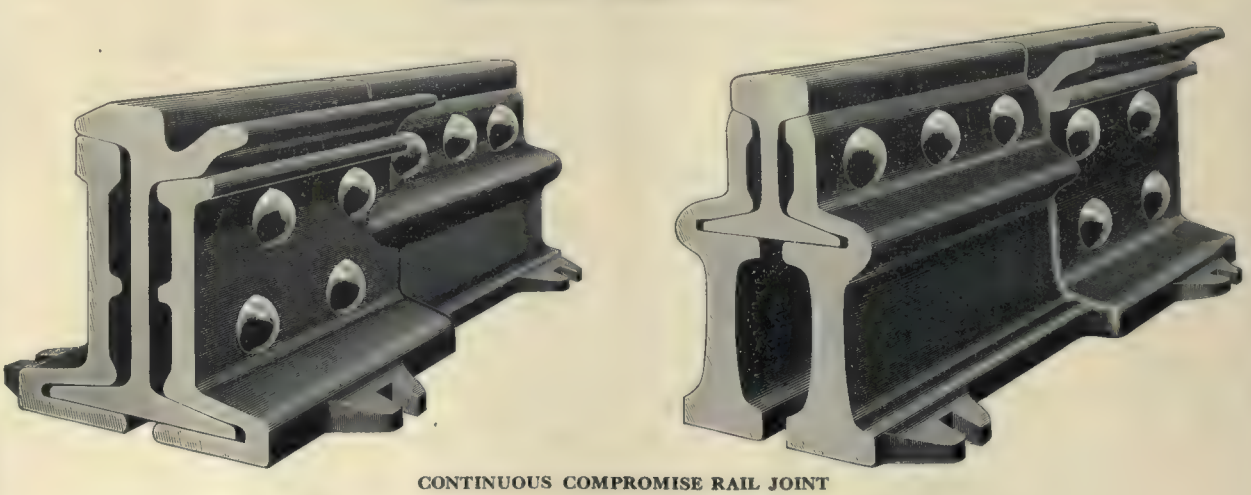


The Rail Joint Company
185 Madison Avenue
New York

Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard Girder, and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints. Patented in United States and Canada.



CONTINUOUS GIRDER RAIL JOINT



CONTINUOUS COMPROMISE RAIL JOINT

ROLLED FROM BEST QUALITY STEEL



WEBER GIRDER RAIL JOINT

AGENCIES

Boston, Mass. India Bldg.
Chicago, Ill. Ry. Exchange Bldg.
Denver, Colo. Equitable Bldg.
Philadelphia, Pa. Pennsylvania Bldg.
Pittsburgh, Pa. Oliver Bldg.
Portland, Ore. Wilcox Bldg.
St. Louis, Mo., Commonwealth Trust Bldg.
Troy, N. Y. Burden Avenue

Montreal, Canada. Board of Trade Bldg.

London, E. C., England. 36 New Broad St.



ARMCO AMERICAN INGOT IRON CULVERTS

under highways and railroads in every State of the Union and in a dozen foreign countries have absolutely demonstrated their Efficiency, Reliability and Lasting Quality.

Their material is the development of many years of investigation and experience in the production of Rust-Resisting Iron, embodying the results of the deepest delvings of science and of the practical observations of the furnace men, the metal workers and the engineers in the field. It is the **purest**, most **even** and most **durable** iron ever placed on the market.

Write the Nearest Manufacturer for particulars and prices on Armco Corrugated Culverts, Siphons, Plates, Sheets, Roofing and Formed Products

Arkansas, Little Rock
Dixie Culvert & Metal Co.

California, Los Angeles
California Corrugated Culvert Co.

California, West Berkeley
California Corrugated Culvert Co.

Colorado, Denver
R. Hardesty Mfg. Co.

Delaware, Clayton
Delaware Metal Culvert Co.

Florida, Jacksonville
Dixie Culvert & Metal Co.

Georgia, Atlanta
Dixie Culvert & Metal Co.

Illinois, Bloomington
Illinois Corrugated Metal Co.

Indiana, Crawfordsville
W. Q. O'Neall Co.

Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Iowa, Independence
Independence Culvert Co.

71557

Kansas, Topeka
The Road Supply & Metal Co.

Kentucky, Louisville
Kentucky Culvert Co.

Louisiana, New Orleans
Dixie Culvert & Metal Co.

Maryland, Havre de Grace
Spencer, J. N.

Massachusetts, Palmer
New England Metal Culvert Co.

Michigan, Bark River
Bark River Bridge & Culvert Co.

Michigan, Lansing
Michigan Bridge & Pipe Co.

Minnesota, Minneapolis
Lyle Corrugated Culvert Co.

Minnesota, Lyle
Lyle Corrugated Culvert Co.

Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.

Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.

Nevada, Reno
Nevada Metal Mfg. Co.

New Hampshire, Nashua
North-East Metal Culvert Co.

New Jersey, Flemington
Pennsylvania Metal Culvert Co.

New York, Auburn
Pennsylvania Metal Culvert Co.

North Carolina, Greensboro
Dixie Culvert & Metal Co.

North Dakota, Wahpeton
Northwestern Sheet & Iron Works

Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.

Oklahoma, Shawnee
Dixie Culvert & Metal Co.

Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.

South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.

Tennessee, Nashville
Tennessee Metal Culvert Co.

Texas, Dallas
Atlas Metal Works

Texas, El Paso
Western Metal Mfg. Co.

Texas, Houston
Lone Star Culvert Co.

Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.

Virginia, Roanoke
Virginia Metal Culvert Co.

Washington, Spokane
Spokane Cor. Culvert & Tank Co.

Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

The Track Gang Used to Heat their coffee on the Rail Joints



The incident here pictured actually occurred

This is an Impossibility where "Electric Welded Rail Bonds" are used

This road was running only a few cars and they had hard work to keep those cars in action.

They were wasting current—wasting time—wasting money.

You too are losing out if your rail joints cause current to leak away from the return circuit. Stop the losses and double-cross claims for electrolysis by putting on Electric Welded Rail Bonds.

The economic reasons why you should are interesting. Let us send you them.

The Electric Railway Improvement Co.

CLEVELAND, OHIO

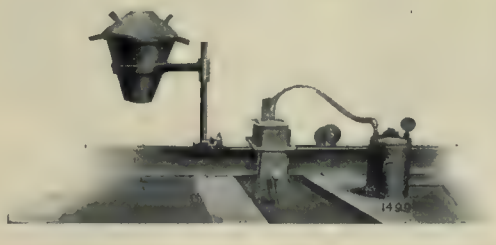
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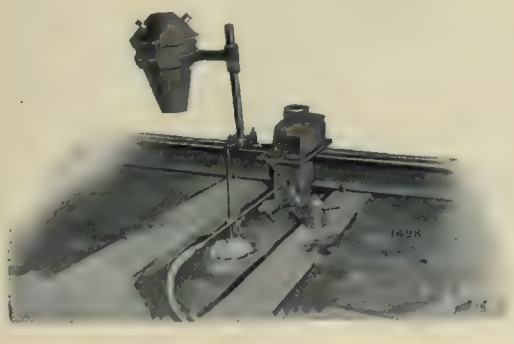
Applying Asbestos and Molasses Strips to Rails Previous to Adjusting Mold



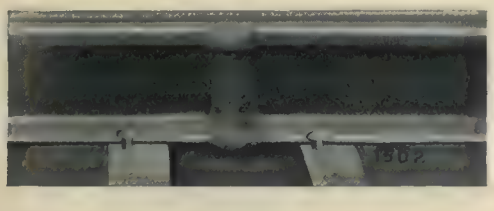
Adjusting Two Part Mold to Rails



Final Luting Process
Blowing Powdered Fire-clay into Mold



Preheating Rail Ends, Heating Thermit Additions and Baking Mold in One Operation



Finished Thermit Fully Welded Insert Rail Joint

You Will Eliminate All Joints from the Track by These Simple Operations

You Can Do the Work Yourselves. We Furnish All Materials and Give Necessary Instructions.

During the past year we have devoted a great deal of attention to simplifying the methods used in welding rails by the Thermit insert process, so as to make it possible for street railway companies to do the welding themselves, thus putting everything in their own hands and enabling them to do the work wherever they please, whether they have one joint or several thousand to weld. This we have succeeded in doing by the perfection of special apparatus for ramming the molds, luting them where they come in contact with the rails and in other ways so simplifying the process that anyone can make the welds if our instructions are carefully followed.

The first cost of necessary materials and apparatus is very low, considering the fact that with them you obtain a fully welded rail joint giving 100 per cent. electric conductivity, and breakages so negligible that they cannot be figured in percentages at all.

This fully welded joint should not be confused with other so-called welded rail joints on the market, as they are only partially welded and none of them obliterate the joint itself. The *Thermit insert joint,* however, comprises the welding of the entire rail section so that rails welded by this method are made continuous, with all joints eliminated.

The improvements referred to above have resulted in not only simplifying the process but in reducing the cost of the joint to a considerable extent, and if you would like to obtain further particulars, write for our Pamphlet No. 3932, which tells the whole story.

Before considering any new construction work for the year 1915, get the information given in our pamphlet.

THERMIT

Goldschmidt Thermit Co.

WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco 103 Richmond St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago

Our Track Special Work is Always Machine-Finished

Bolted down inserts on partially or completely machined bearings are believed to be necessary to meet many present-day, heavy traffic conditions.

Abstracted from Electric Railway Journal of September 19th.

It explains the Rigid Construction and Long Life of

Manganese Insert Frog with Cast Steel Body



Falk Special Work

Our Manganese-Center type of Special Work is a construction that has made possible such a conclusion as "Insert Special Work equals the serviceability of Solid-Manganese Steel Special Work," which appeared in an article in the September 19th issue of the Electric Railway Journal.

It will pay you to specify FALK Manganese-Center Frogs and either the Manganese-Center type of switches and mates or the Solid-Manganese construction, because our Manganese inserts are always machine fitted, insuring an absolute bearing, and our Solid-Manganese pieces are machine-finished throughout.

The Falk Company

Milwaukee

NEW YORK CITY—Wendell & MacDuffie Co.

LOS ANGELES—Alphonso A. Wigmore SEATTLE—Parrott & Co.

SKEE-BALL

A Profitable and Fascinating Trolley Park Attraction



"Seven Thousand Six Hundred and Twenty-three Games Were Played on these Four Alleys in Thirty-two and One-Half hours at the American Electric Railway Association Convention last October."

This game will draw the people to your park and make big money for your concessionaire.

Order now for early deliveries

We have some mighty convincing figures on receipts from this game. Better ask us for them.

The J. D. Este Co., 1534 Sansom St., Philadelphia, Pa.

55,000,000
Dollars

for maintenance is spent annually in normal times by electric railways.

What will it be this year?

Whatever it is, it will still be considerable and worth going after hard—if you want your fair share.

Always, the maintenance work goes on in Spring.

The problem before the electric railway man at this time is

"*What* shall we buy?

That he *must* buy, he knows.

What he is now seeking is information about anything that will help him toward efficiency and economy in his maintenance purchases.

Where does he seek this information? If you know that, you know how to get your product prominently before him at this buying period.

For years electric railway men have eagerly sought and welcomed the

Electric Railway Journal's Annual Maintenance Number

It is their buying guide. Its advertising pages show what's on the market. That is why this issue has always been welcomed by manufacturers of electric railway materials as an opportunity to present and drive home their selling arguments. This year's opportunity, the 1915 Annual Maintenance Number, will be issued

March 20

The text pages will be devoted primarily to this live subject of maintenance work. Shop methods, descriptive articles featuring phases of maintenance work, helpful editorial articles—all tending further to intensify the interest in maintaining equipment in prime condition—all tending toward *more active buying* for buildings, power houses and substations, rolling stock, overhead and track.

Make your advertising story a part of this big, helpful, interesting and timely issue. **Take a full page or a double page spread** and get into that space the kind of attention-arresting, interest-arousing, desire-creating copy that will be reflected in your sales totals within the next few months—that will swing toward you a fair share of the fifty-five millions of dollars which will surely flow into the coffers of those manufacturers who most actively and effectively strive for the business.

Send data or catalogs *now*, and let us prepare a suggested advertisement for you, to appear in this important issue.

Electric Railway Journal, 239 W. 39th St., New York

Member Audit Bureau of Circulations

A New Standard in Practical Engineering Literature
A New Record in Book Sales

Our method of sending the Power Plant Library for free inspection to any one interested in power plant work has enabled us to register a new record in engineering book sales.

The first issue of this library was placed on sale in November, 1913, and within three weeks every set was sold. A second issue containing treble the number of books was immediately printed. This second issue lasted only sixty days.

THE THIRD ISSUE IS NOW NEARLY EXHAUSTED.

Every set of the Power Plant Library sent out to date went with the stipulation that it was to be returned at our expense if not satisfactory. The percentage of returns is so small that it can hardly be computed.

What does this new record in engineering book sales indicate? In the first place it bears us out in our belief that the power plant field had not heretofore been covered in book form, at least completely and practically. It proves that the practical steam and electrical engineer wants facts without theory, facts in compact form, facts about actual practice of today, not of tomorrow or yesterday.

There is so much valuable material in the Power Plant Library, that not alone does the practical man in the power plant field find it an essential, but it is being used for daily reference by thousands of technically trained men.

There is not a reader of the Electric Railway Journal who does not need the Power Plant Library for either study or reference. To any one who will return the coupon below, we will send the books for free inspection. No references are required and you are put to no expense, as we pay charges both ways. By returning the coupon, you do not obligate yourself in any way. You merely pay $1 per month for twelve months or return the books in ten days.

NO MONEY DOWN



TITLES:

Practical Mathematics, 650 pages
Power Catechism, 226 pages
Valve Setting, 209 pages
Boilers, Piping, Pumps, 435 pages
Shafting, Belting, Governors, 286 pages
Electrical Catechism, 422 pages
Steam Turbines, 186 pages
Mechanical Refrigeration, 172 pages

McGraw-Hill Book Co., Inc.
239 West 39th Street, New York
Publishers of Books for Electric Railway Journal

COUPON

McGraw-Hill Book Co., Inc., 239 W. 39th St., New York

Gentlemen — Ship to me, charges paid, your new Power Plant Library, eight volumes, price $12.00. If satisfactory after examination, I will send $1 in ten days and $1 per month until paid. If not wanted, I will write for shipping instructions.

Signature

Res. Address

City and State.....

Where employed

Occupation.....E.R.J. 2-6

RECLAIMING OLD COILS BY

Vacuum Drying and Impregnating Process



A Corner in Our Shop Showing Apparatus

We have been making new coils out of old, with the attending saving in expense, for so long a time that we have come to be regarded as a very reliable source of supply for this money saving service.

Our field coil and impregnating plant is probably the largest and most complete commercial plant in the country.

Our process of vacuum drying and impregnating means the positive elimination of all moisture from the coil first, and then the forcing of the best known insulating compound into every crevice of the coil, making the coil itself a solid mass and eliminating all possibility of short circuit.



Our Working Force

We employ only thoroughly experienced men, whose every performance is under the careful personal supervision of an expert on work of this kind. There is only one possible excuse for our impregnating service, and it is to make your old coils over as good as new, and at a saving in cost which will be "worth while."

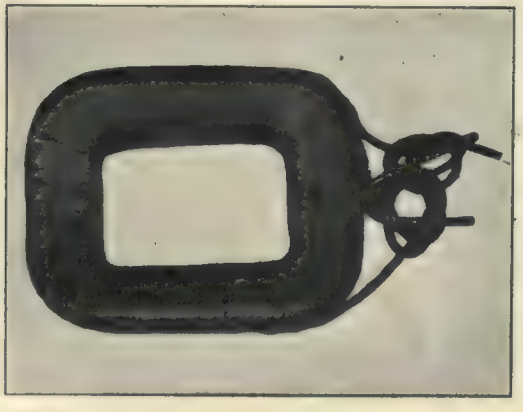
That is precisely what we do.



The Coils We Get From You

Many of the coils that come to us are just bunches of wire, just junk; yet we strip these coils, clean and straighten them and re-insulate them, and return them to you practically new coils and fully guaranteed.

There is no experimenting about this service. We are saving money for a great many representative electric traction companies throughout the country.



The Coils We Return To You

Will prompt you to send us all of your coils that go bad, instead of consigning them to the scrap heap.

We will gladly send you data which will indicate the money saving values of our service, and we will gladly send you the names of many electric roads who use our impregnating service regularly.

This is one way and a sure way to reduce operating expenses, and now is a good time to do it.

Electric Operations Co.

Bush Terminal, Brooklyn, N. Y.

7129-P

DAVIS-BOURNONVILLE CO.
DAVIS
APPARATUS
NEW YORK - CHICAGO

Oxy-Acetylene Welding Equipment Paid for Itself in one week

Form 913 (new)

STONEGA COKE & COAL COMPANY
INCORPORATED

W. C. SHUNK, SUPERINTENDENT.
POWER AND MECHANICAL DEPARTMENT

STONEGA, VA.

October 27, 1914.

Davis-Bournonville Co.,
Jersey City, N. J.

Gentlemen:--

This is to advise that Mr. L. F. Shepard has today completed his demonstration with your Autogenous Welding Apparatus with which we are very much pleased.

During Mr. Shepard's stay of one week here we have realized a saving more than equal to the cost of the equipment, he having made satisfactory welds on Railroad locomotive frames, steam engine cylinders and various other repairs that would have been impossible without the use of this apparatus.

Mr. Shepard's expert advice to our employees has been very valuable and satisfactory, and we wish to thank you for his valued services.

Yours very truly,
W. C. Shunk
Supt. Power & Mechanical Dept.

S-S ccLFS

Write our Service Department for full information on Oxy-Acetylene Apparatus to meet *Your* Requirements.

Ask for "Autogenous Welding," January issue.

Davis-Bournonville Company

New York Chicago

General Offices and Demonstration Plant, Marion Station, Jersey City, N. J.
Chicago Offices, Monadnock Block, Jackson and Dearborn Streets, Chicago

STAR BRAND
Made to Wear
To Wear
Well
WEATHER PROOF WIRE

Winter Winds and Driving Sleet Will Soon be Sweeping Against Your Overhead System

Streaming arcs of fire will soon mark the course of your trolley wheels as they follow the ice-bound wire. It takes *tough trolley wire* to withstand the winter service, and it takes tough feeder wires and cables, too, to bear the strain of the tons of ice. Our

ROUND, GROOVED AND FIGURE 8

TROLLEY WIRE

and

Star Brand Weatherproof Wire and Cables

on hundreds of miles of electric railway lines is proving its efficiency and economy by its enduring strength and successful resistance to the fury of wind and storm. In every clime our trolley wire and Star Brand weatherproof wire and cables is cutting overhead maintenance costs.

Write for list and data.

American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street
71659

Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Ave. So.

RELIABILITY - PERMANENCE - ECONOMY.
OKONITE
TRADE MARK
REG. U. S. PATENT OFFICE.

The STANDARD for RUBBER INSULATION

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE—MANSON TAPE—CANDEE WEATHERPROOF WIRES—CANDEE PATENTED POTHEADS.

Samples and Estimates on Application

THE OKONITE COMPANY, 253 Broadway, New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.



TIME IS SAVED

on your running schedules by eliminating the conductor-operated signal. This stopping a car in order for a man to run out and throw a signal switch is a nuisance to passengers. And there's the *risk* of your man *forgetting to do it.*

Chapman Automatic Signals

eliminate the risk, save the time and shorten schedules, besides securing better service to your passengers. And the cost is very moderate. If you are operating at thirty miles an hour or less, Chapman Signals will give your road perfect protection at a big saving over more complicated and costly signal systems. Let us tell you what we have done for other roads.



Charles N. Wood Co., 79 Milk St., Boston, Mass.

7136



4-inch HARRINGTON JOINT "ON THE JOB"

ORANGEBURG

Fibre Conduit

A thoroughly tested material.

Has been in use for over 20 years and found to be the best insulator for underground cables.

Book "R" will tell you of tests and other features.

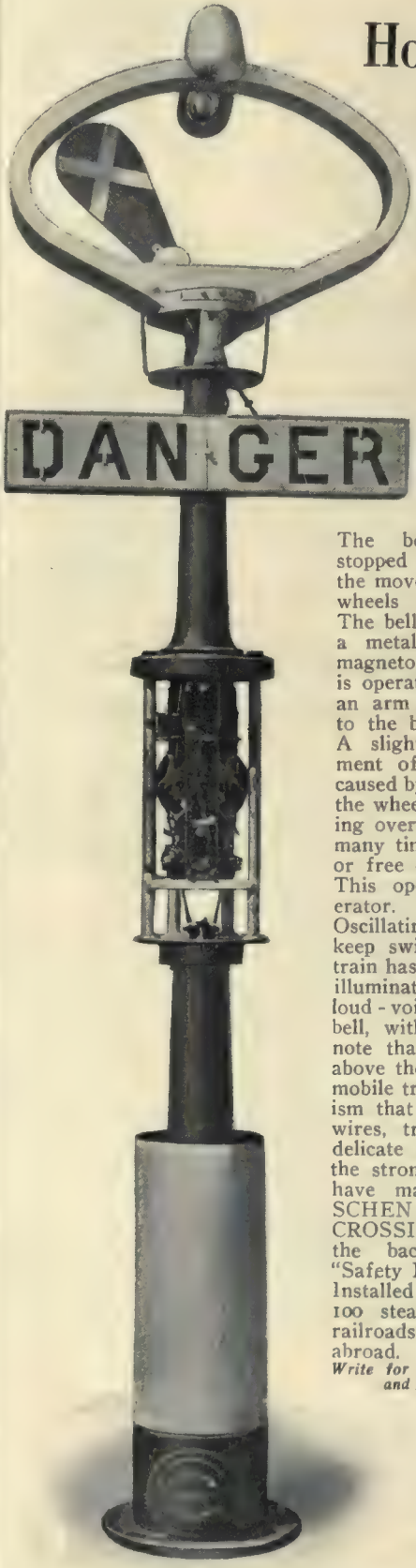
The Fibre Conduit Company

Orangeburg, N. Y.

New York Boston Chicago San Francisco

Maximum Certainty and Safety with Minimum Installation and Maintenance Cost

The Hoeschen Highway Crossing Signals



Does not interfere with track circuits and is not operated by trolley current. Free from electrical troubles.

The bell is started, stopped and wound by the movement of the car wheels over the track. The bell is connected by a metallic circuit with magneto generator which is operated by means of an arm clamped rigidly to the base of the rail. A slight lateral movement of the rail head, caused by the pressure of the wheels of train passing over it, is multiplied many times at the outer or free end of the arm. This operates the generator.

Oscillating blades which keep swinging until the train has passed; a night illuminated warning; a loud-voiced locomotive bell, with a peremptory note that can be heard above the noise of automobile traffic; a mechanism that needs no bond wires, track circuits or delicate apparatus—are the strong features that have made the HOESCHEN HIGHWAY CROSSING SIGNAL the backbone of the "Safety First" movement. Installed on more than 100 steam and electric railroads in America and abroad.

Write for Descriptive Matter and Photographs

Hoeschen Mfg. Company

OMAHA, NEB.



Gate at Danger
D. L. & N.-W. Ry.

On Comes the Traveller!
On Comes the Train!

An Accident!

—loss of life—claims—litigation—trouble—expense—publicity—damaging criticism?

NO—there's a COOK AUTOMATIC SIGNAL GATE Guarding the Crossing

Let the train come—down goes that moving arm—down goes the barrier—loud rings the warning bell. And in the night, when the bell might annoy, the brilliant red light gleams its danger signal—the illuminated semaphore and barrier shine out in relief against the dark. Safety is assured—if your crossings are guarded by the Cook Signal Gate. Get complete details.

The Cook Railway Signal Co.
1793 South Broadway, Denver, Colo.

71718



"All along our lines"

said the chief dispatcher, "you will find our road-men—conductors, inspectors and construction foremen —carrying

Western Electric
Portable Telephones

as a part of their regular equipment.

The portables have prevented a great many expensive delays and some possible accidents simply by giving our men a means of getting in touch with the division dispatcher from any point on the road. They're worth their weight in gold."

Write for prices of our various types of portables.

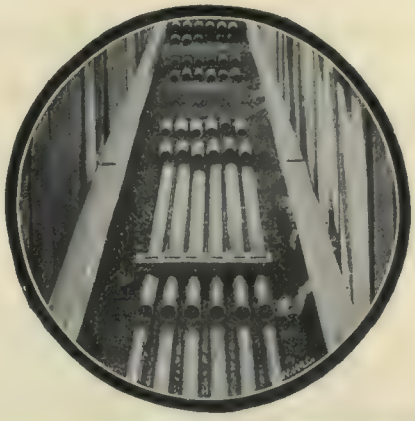
Western Electric Company

Manufacturers of the 8,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco
Buffalo	Richmond	Milwaukee	Omaha	Oakland
Philadelphia	Savannah	Indianapolis	Oklahoma City	Los Angeles
Boston	New Orleans	Cleveland	Minneapolis	Seattle
Pittsburgh	Houston	Cincinnati	St. Paul	Portland
St. Louis	Dallas	Denver	Salt Lake City	

EQUIPMENT FOR EVERY ELECTRICAL NEED

Member Society for Electrical Development. "Do it Electrically"



Style "M" Straight Socket Joint

You Want Conduit That Combines Great Durability, Efficiency, Economy

Here It Is

J-M FIBRE CONDUIT

And Here's Why

Great Durability, because of its solid, homogeneous construction from specially-treated fiber, formed under pressure and made water, oil, acid, gas and chemical proof. Will not break, corrode or decay.

Great Efficiency, because of its dielectric and mechanical strength, complete insulating value, perfect water and gas-tight joints, smooth bore, and fire-resisting quality.

Great Economy, because it gives better and longer service than other conduits; because it weighs one-sixth as much as tile or stonewear conduit—hence reduces trucking and freight charges 80 per cent., and cuts down labor cost; because it can be laid by unskilled workmen; because it comes in longer sections than tile or stoneware conduit, yet costs no more; because it can be laid in a shallower trench than other conduit, cutting down labor cost still further.

Write our nearest Branch for "J-M Fibre Conduit Booklet."

H. W. JOHNS-MANVILLE CO.

Manufacturers of Service, Subway and Transformer Boxes; Fuses; Line Material; Insulating Materials; Fireproof Wood; Friction Tapes; Dry Batteries; Lighting Systems, etc.

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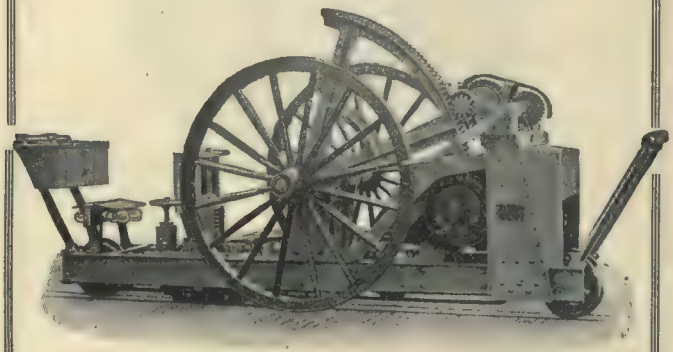
THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED.
Toronto Montreal Winnipeg Vancouver

For Great Britain and Continent of Europe:
TURNERS & MANVILLE, LTD., Hopetoun House, 5, Lloyds Ave., London, E. C.

Member of the Society for Electrical Development, Inc.
"DO IT ELECTRICALLY" 2376

10 Blocks of Track Already Slated for Renewal

—Saved by the



"Reciprocating" Track Grinder

The track was in very bad shape and the reciprocating grinder was tried as an experiment.

By cutting out a few of the very worst joints, tamping a little and with days of grinding the track is today in first class condition although pronounced worthless four years ago.

This company now operates four Reciprocating Track Grinders.

The track is carefully watched and as soon as defects become apparent —the Reciprocating Grinder is put to work.

This company adopted the Reciprocating Grinder because it avoids excess removal of metal—

—because it assures a perfectly true surface and because it gives the least interference to car movements.

Those are the factors that count—and they are obtainable only from the reciprocating method of grinding.

Let us explain to you in detail just how the Reciprocating Grinder as one of your regular maintenance of way tools, will pay big returns on the investment.

Write us for data.

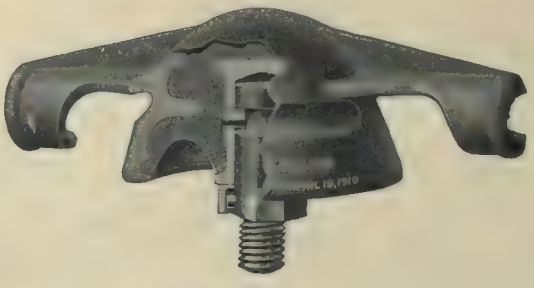
Railway Track-work Co.

Heed Building, Philadelphia, Pa.

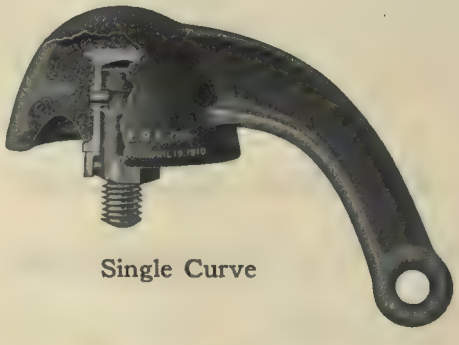
"UNIVERSAL ROUND TOP HANGERS"

with Revolving Stud and Hexagon Floating Jam Nut

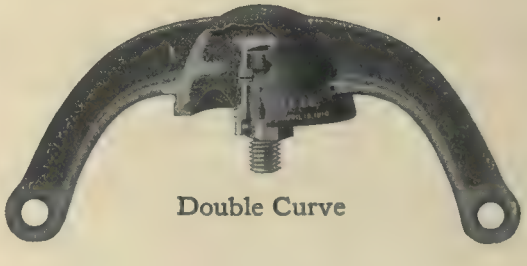
Patented April 19, 1910



Straight Line



Single Curve



Double Curve

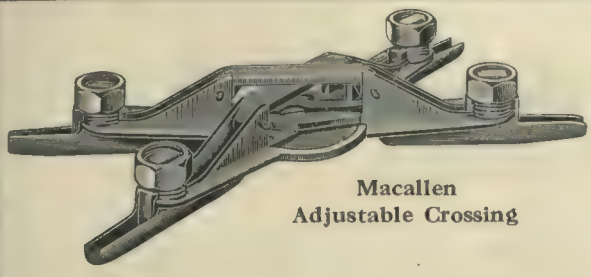
Standardize your Overhead Equipment.

Use UNIVERSAL ONE-PIECE HANGERS, and eliminate all line troubles. Descriptive folder on request.

ELECTRIC RAILWAY EQUIPMENT COMPANY

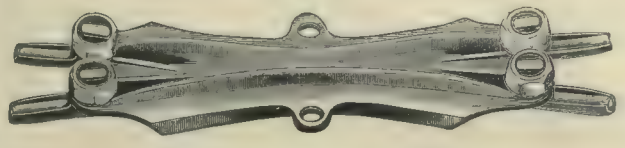
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30 Church Street, New York City



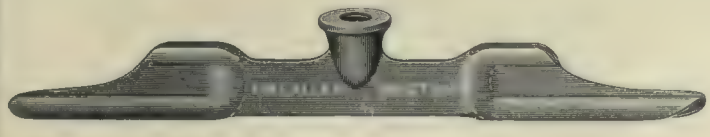
Macallen
Adjustable Crossing

What the Name MACALLEN Means on Overhead Material



Macallen Rigid Crossing

Any broad-gauged, widely experienced salesman will tell you that in the last analysis the biggest selling force entering into the problem of successful manufacturing and marketing is the *goods*. The cleverest salesmen, the most able advertisement writers, the most vigorous selling campaigns cannot achieve a *permanent* success unless the *goods* are *right*.



Standard Splicing Ear

Macallen electric railway material has succeeded because it *deserves* to succeed —because it is designed right—built right —of right materials—because it delivers the *service*—and is backed by a square deal policy.

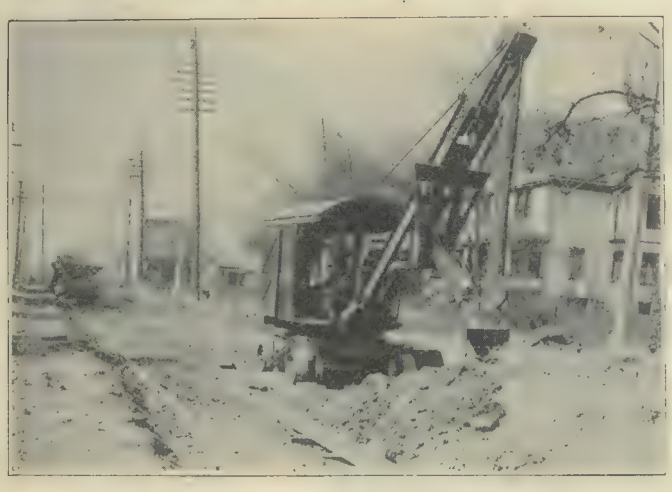
TRADE MACALLEN MARK.

The Macallen Company

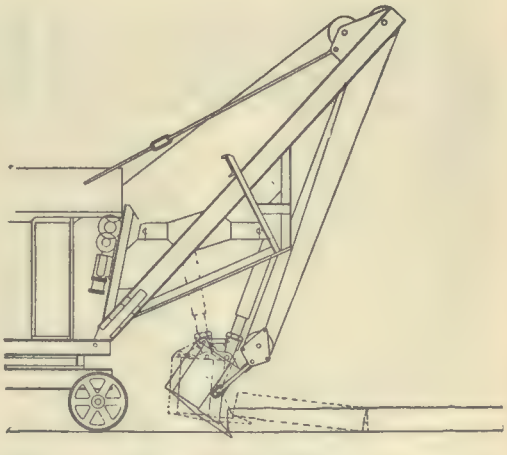
Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.

71672



Here Is The Thew's Work



Here Is How The Thew Does It

Shallow cuts—removal of old macadam for track laying—grading work in close quarters—tearing up old track, etc.—these are your problems. The Thew is designed especially for such work. *The horizontal crowding motion of The Thew* cuts clean and true to grade—does the work quickly and cheaply.

Used on old macadam or concrete foundations, the *crowding motion* is *reversed* to apply a *powerful prying motion.*

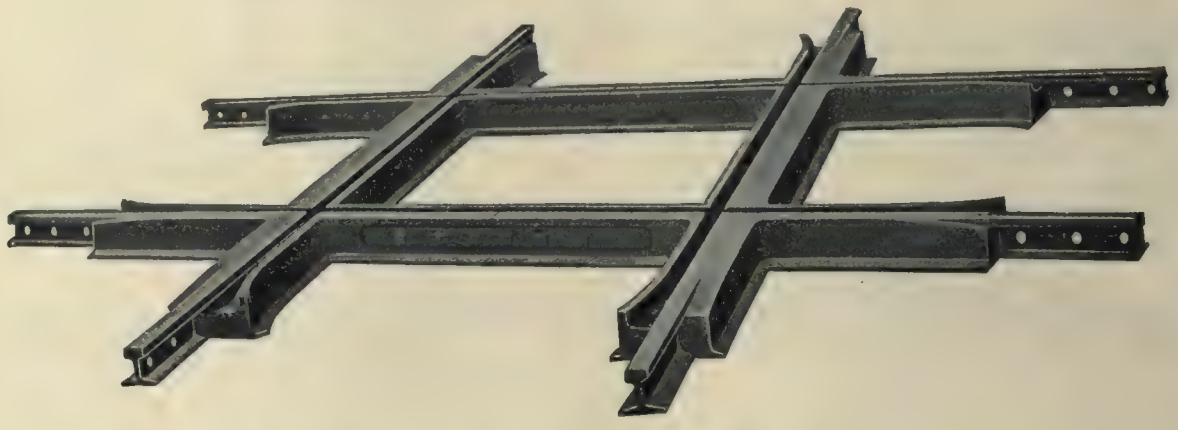
The Full Circle Swing of *The Thew* enables it to work in close quarters without stopping traffic.

Write for Catalogue "F" and list of Electric Railways using Thews.

The Thew Automatic Shovel Co., Lorain, Ohio

Frogs, Crossings, Switches and Mates for Electric Railway Service

Products of the Highest Grade Workmanship and Material.
May we Estimate on Your Requirements?



BARBOUR-STOCKWELL CO.
205 Broadway, Cambridge, Mass.

CAMBRIA RAILS

Open Hearth Bessemer

BOLTS AND NUTS

100%
Splice Bars
Tie Plates



All Standard Sections

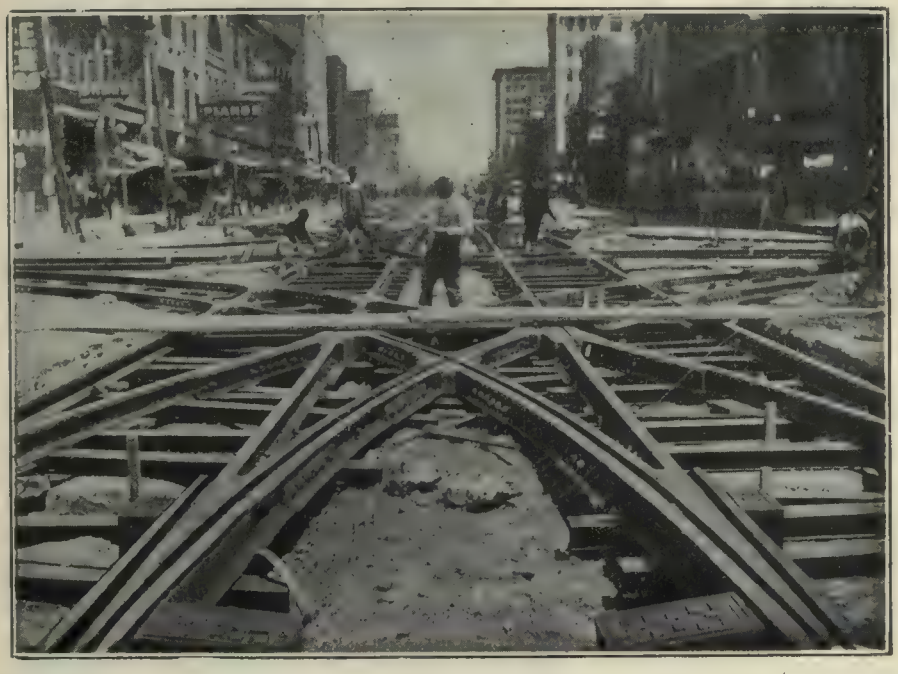
CAMBRIA STEEL COMPANY

Philadelphia

Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Tacoma, Montreal
Works at Johnstown, Pa.

CARNEGIE STEEL COMPANY

General Offices—Pittsburgh, Pa.



STEEL CROSS TIES

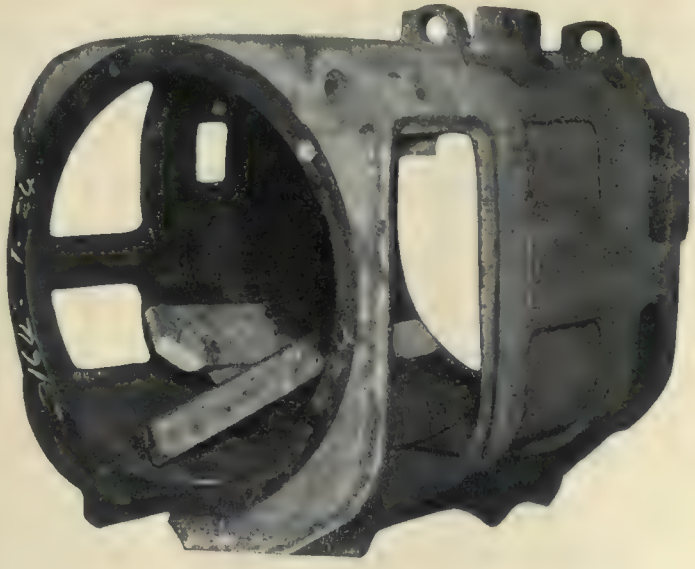
are absolutely the best and cheapest permanent construction.

Introduction of economies are always desirable, especially where they are combined with efficiency, as in the case of steel ties.

By their use economy is reflected through your various departments.

A Single Welding Operation at a Cost of $2 Saves Motor Housing Worth $165

The OXWELD PROCESS



Here was a cracked motor frame 36 in. long, 26 in. in diameter, weighing 1800 lb. and valued at $165.00.

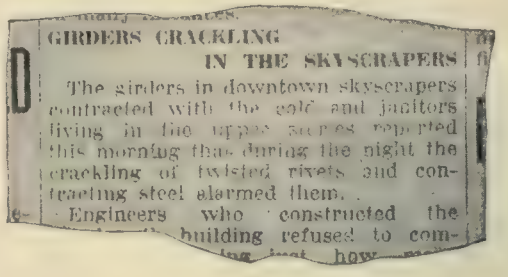
The thickness of the metal varied from 1 to 2 inches. There was a crack at one end 6 in. long. This crack was welded in a few hours by the Oxweld Process. Thus the cost of a new housing was saved and the motor put back into service with the minimum loss of time.

This illustration gives an idea of the utility and scope of the Oxweld Process in an electric railway shop.

It shows how a single operation saved at a cost of $2 a piece of equipment worth $165.

Isn't apparatus which will effect such savings worth investigation? Write for further particulars.

CHICAGO, ILL. **Oxweld Acetylene Company** NEWARK, N. J.



GIRDERS CRACKLING
IN THE SKYSCRAPERS

The girders in downtown skyscrapers contracted with the cold and janitors living in the upper stories reported this morning that during the night the crackling of twisted rivets and contracting steel alarmed them.

Engineers who constructed the building refused to com-

Cold that causes the contraction of steel and other metal surfaces often destroys the protecting paint film. Paint that dries hard and brittle is the first to suffer. Through the fissures of a broken paint film, rust and decay enter and eat their way.

DIXON'S
SILICA-GRAPHITE
PAINT
"The Longest Service Paint"

provides an elastic film which is neither broken by the expansion of extreme heat nor the contraction of extreme cold. For this and many other good reasons explained in booklet No. 108-B you should order or specify Dixon's.

Made in Jersey City, N. J., by the

Joseph Dixon Crucible Co.

ESTABLISHED 1827



FORD TRIBLOC
A CHAIN HOIST that Fulfils Every Requirement

It is built in sizes from ¼-ton to 40-ton capacity. No matter what size you need or how severe the service, you will find the Tribloc the most satisfactory Chain Hoist built.

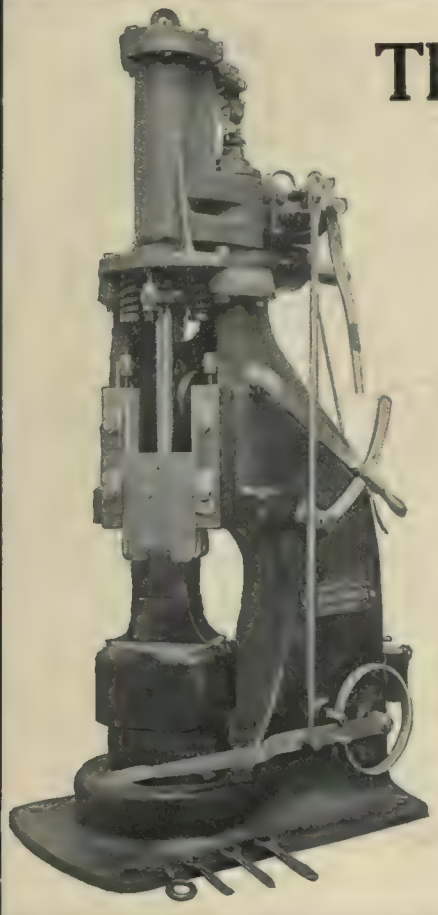
It has planetary gearing (which is enclosed in a dust-proof steel case), steel parts, a 3½-to-1 factor of safety in its weakest parts, and eighty per cent. of the power applied to the hand chain is converted into lifting energy.

The chains and hooks used on the Ford Tribloc are of the best material and workmanship procurable, and all our claims are backed by a five-year guarantee.

We also build Screw Hoists, Differential Hoists, and Steel Plate Trolleys. Our catalog describes them all. Write for your copy now.

FORD CHAIN BLOCK & MFG. COMPANY

142 Oxford Street, PHILADELPHIA, PA.



The Steam Hammer that is Always Ready for Use

When the smith goes to his steam hammer with a job, he wants to find it in perfect running condition, and ready for action the instant he moves the operating levers.

Bement Steam Hammers

are so designed that with very little attention they can be operated continuously without breakdowns. Here are a few of the features that enable Bement Hammers to be always on the job.

Valves Simple and Substantial

The main valve is simple and substantial, consisting of but few moving pieces which require practically no adjustment. The throttle valve is of the rotary type, simple, and requiring no particular care for its maintenance.

Wear Readily Taken Care of

The guides are provided with taper shoes so that the wear of the ram is readily taken up. Valve gearing is designed to have its downward motion by its own weight so that lost motion due to wear has no bad effect on the operation of the hammer. The main valve is of the piston type balanced in a bushing and hence does not bear or wear on the main cylinder casting.

Write for Catalog "Bement Hammers." Sizes 250 to 40,000 lbs.

NILES-BEMENT-POND CO.

111 Broadway, NEW YORK

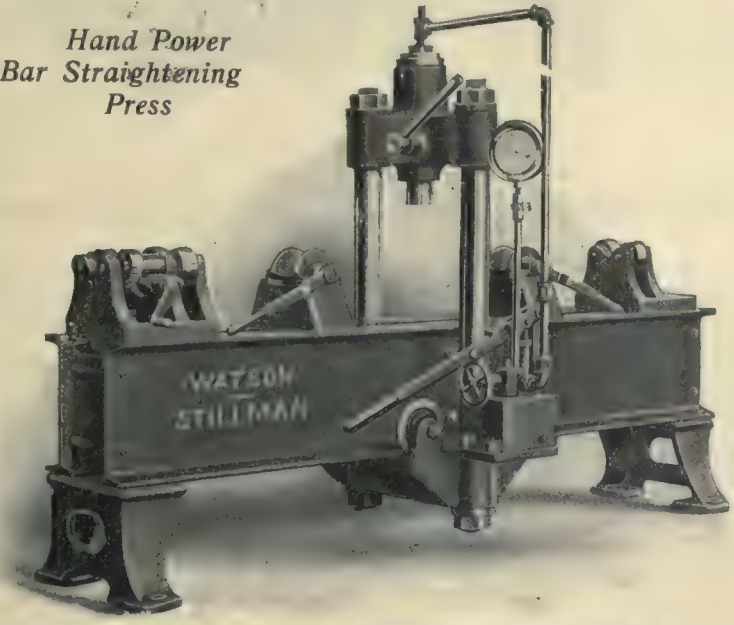
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1758

THIS PRESS WILL STRAIGHTEN YOUR CAR AXLES PROPERLY AND ECONOMICALLY

We have furnished many car shops with hydraulic presses of this type for straightening axles, shafting and bars, and for doing hundreds of odd bending jobs.

Hand Power Bar Straightening Press



The ram has a vertical movement of 4 in. The idle portion of the stroke to and from the work is accomplished by a rack and pinion independent of the pump. The bending blocks and roller stands are adjustable to any position on the bed. The traveling frame permits a bending operation at any point between the roller frames.

We build many sizes of hydraulic benders, all as carefully designed as this machine to give the user the best service.

Write for catalog 82 giving details of our big line of railway hydraulic machines including Jacks, Forcing Presses, Pit Jacks, Wheel Presses, Shears, Bending Presses, etc.

The Watson-Stillman Co.

Engineers and Builders of Hydraulic Machinery

46 Church Street New York

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PHILADELPHIA—The Bourse.
PITTSBURGH—Brown & Zortman.
ST. LOUIS—Corby Supply Co.
KANSAS CITY—Geo. T. Cook.
DENVER—L. C. Ullrich.
ATLANTA—Sterling G. Turner.

W-S HYDRAULIC

238

VANADIUM STEEL
ROTOR RINGS



VANADIUM STEEL ROTOR END RING.

As a result of thorough tests, the Allis-Chalmers Manufacturing Company have adopted vanadium steel as standard for the rotor end rings of their turbo-generators. Previously they were using chrome-nickel steel.

Peripheral speeds of these rotors vary from 18,000 to 24,000 feet per minute. Stresses in the rings are consequently high.

Allis-Chalmers adopted vanadium steel for these highly stressed parts because of the higher and more uniform physical properties.

Their report on the subject is given in "Facts."

Write for copy.

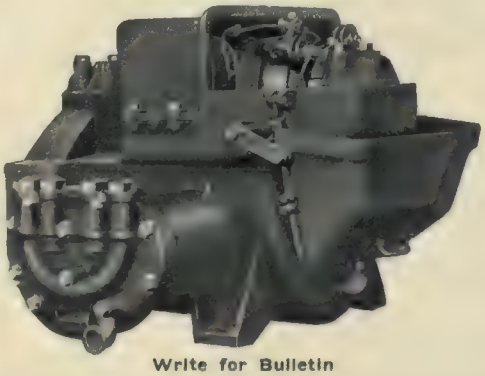
AMERICAN VANADIUM COMPANY
343 Vanadium Building, Pittsburgh

The Allis-Chalmers 3 Air Compressor

is SMALLER—LIGHTER—HAS NO GEARS and yet has GREATER CAPACITY than the Ordinary Compressor.

Weighs 390 (425 with cage) as compared to 850 lbs.
Height is 14 inches as compared to 25 inches

Type AA7



Write for Bulletin

Direct Connected



Some of the Advantages of the

Allis-Chalmers AA7 Air Compressor

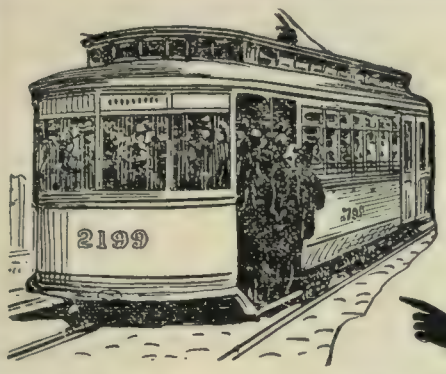
over other compressors of the same type—

One-Piece Herringbone Gear, insuring accurate meshing and great strength—Replaceable Bushing takes the wear in the cylinder and obviates the High Cost of Reboring—Pipeless Construction facilitating easy removal of Cylinder Head—Improved Brush Holder, adjustable with screwdriver. Oil supplied through one vent and distributed automatically.

ALLIS-CHALMERS MANUFACTURING COMPANY
MILWAUKEE, WIS.

For all Canadian business refer to Canadian Allis-Chalmers Co., Ltd., Toronto, Ontario, Canada.

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The Problem of the Interurban

The Foul Air Problem of the City Car



BOTH are Solved by Use of

The ODORLESS DISINFECTANT

Trade Mark

It acts at once, purifying and deodorizing the air, killing floating typhoid, diphtheria and pus bacteria and sweetening and sterilizing whatever it comes in contact with.

Requires but a few ounces of O D liquid to the gallon of water to make a disinfecting scrubbing solution for floors, seats, straps, toilets, etc., etc.

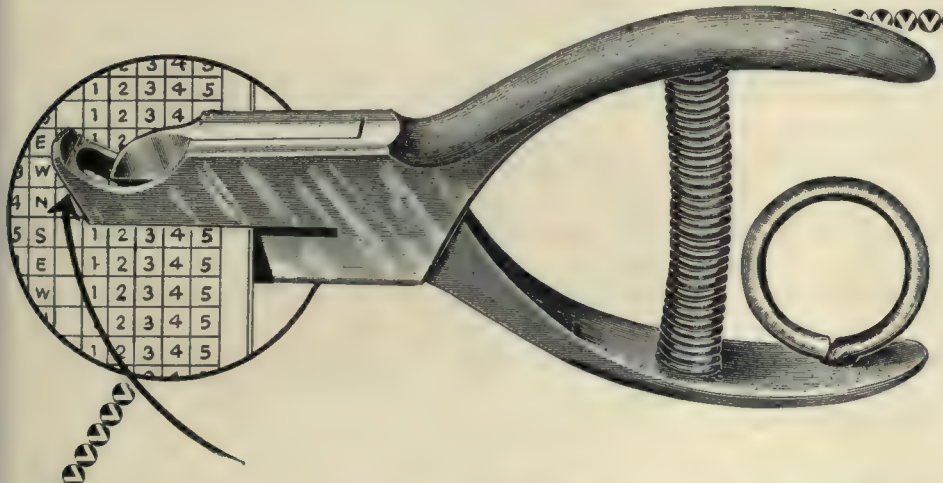
Its germicidal or germ-killing qualities and its value as a preventive of contagion is proven by tests and reports of eminent bacteriological experts.

Put up in quantities from two-gallon size to 5-barrel lots. We can cite you the best of references and indorsements.

Send us trial order. Prices on request.

Gardner & Company, Joliet, Ill.

WRITE FOR DESCRIPTIVE LITERATURE



B-V Visible Punches

Standard Open Sight Punch Quick and Accurate

The conductor can see *through* the punch, enabling him to punch the correct spot with speed and precision. This is a great advantage, especially on lines where traffic is heavy, promoting better service in behalf of both company and public.

The tool steel dies in B-V Punches insure long service and economy. They cost no more than the ordinary kind. Send for prices and catalog.

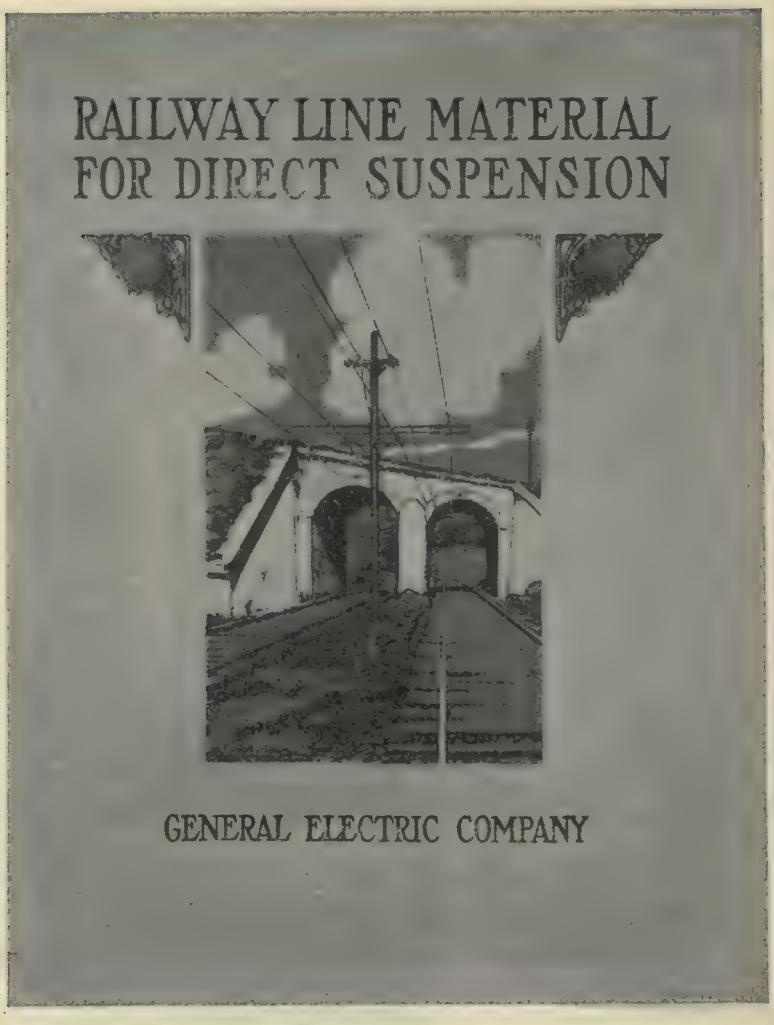
BONNEY-VEHSLAGE TOOL COMPANY

124 Chambers Street, New York **Factory, Newark, N. J.**

7718

The Guarantee of Excellence

on Goods Electrical



The Guarantee of Excellence

on Goods Electrical

Send for your copy of this new bulletin just off the press.

It lists every device for direct suspension made by the General Electric Company and contains much valuable general information and engineering data relative to the subject of line material. Every electric railway purchasing agent and engineer should have a copy of this catalog.

Ask for Bulletin No. 44004—It's free.

General Electric Company

General Office: Schenectady, N. Y.

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5308

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY, FEBRUARY 6, 1915 No. 6

THE NEW ORLEANS MODEL CAR

The new car for New Orleans which is described on another page of this issue stands unique, if such a term can be applied to conservative design, as a combination of practically everything that has fully demonstrated its worth in modern car construction. Naturally, the most prominent feature is the invasion of the South—that stronghold of the wooden car—by an all-steel design. Next in interest is, perhaps, the fact that the weight, 36,100 lb. for a 47-ft. 8-in. car, is one of the lowest that has been recorded. However, that the low weight was not attained by skimping the structure is manifest from the published sizes of the members as well as from the illustrations, which show constructions that remind one almost of steam railroad practice rather than the usages common to city surface cars. One innovation of special importance for electric railways, but which may not be particularly obvious, is the absolute elimination of ornamental painting on the car body—something from which it is well rid. Of course, the painting schemes of recent years have been vastly less objectionable than the "moving van" styles of the earliest days. Yet there has seemed to be no tendency to give up the principle of arraying surface cars in all the colors of the rainbow supplemented with enough perfectly useless information in gilt letters to supply a correspondence school. The start that has been made by New Orleans toward plain, and therefore sensible, painting is most acceptable. In conclusion, the use of end platforms on such a model car may, perhaps, require comment, and it is only fair to the center-entrance principle to say that the "Jim Crow" law of New Orleans practically prohibited its consideration. On the other hand, of course, this is no proof that otherwise the center-entrance would have been used.

AN UNUSUAL "FLYWHEEL EFFECT"

Some years ago when the three-phase locomotive was attracting considerable attention on account of its extensive adoption on the Italian State Railways and elsewhere, quite a little stress was laid upon the way in which stored energy distributes itself in that system. If there are a number of three-phase trains in motion their energy is available to assist the power plant in starting another train. The draft of power by the accelerating train has a tendency to slow down the whole system, reducing the frequency, and for a time the moving trains draw less power and thus relieve the power station. That the same phenomenon appears in the single-phase system and must for the same reason appear also in heavy d.c. systems is indicated by the recent experience of the New Haven road, as described by W. S. Murray. When the heavy extra loads were imposed on the system by the electrification from Stamford to New Haven the peaks of power-plant load which were to be expected in view of the enormous freight trains handled did not materialize. In fact the form of the power-plant load line was improved. This resulted from the lowering of voltage due to heavy draft of current, the voltage dropping suddenly and leaving the operating trains moving at speeds higher than those corresponding to the reduced voltage. Their loads were thus taken off the power station and relieved it to that extent while they were coasting. In this way from different immediate causes, but fundamentally on the same general principle, railway systems employing constant-speed and variable-speed motors act like huge flywheels.

CONFERENCES WITH COMMISSIONS

It is difficult to understand why the Public Service Commission for the First District of New York has been subjected to suspicious criticisms during the last week because Secretary Whitney testified that conferences are often held between the individual commissioners and officers of the public utilities in the district. Perhaps these criticisms can be explained, but not excused, by reference to the dust-covered idea that public service commissions are grand juries to hear testimony against the utilities without permitting them to enter replies. The true function of regulating bodies, as now generally stated, is to act as a mediator between the public and the corporations and not to serve as an *ex parte* tribunal in either direction. It is absurd to suppose that corporation officials have not the same right of presentment of data that is bestowed upon public complainants. Wherein, then, lies the wrong—that the conferences are not public and that some complaints are dropped thereafter? In truth, such objections would betray a most lamentable lack of a proper understanding of commission work—such an understanding as led the engineer of one of the Western commissions recently to say that the informal complaints settled by any commission measure much of the real service being rendered by it. Sixty per cent of the complaints received by this commission are settled by informal conferences with the utilities, and it is stated that the ideal condition would exist if 90 per cent of the work were handled in this way. The saving in time, cost and temper secured by the settling of as many complaints as possible in an informal manner makes the method highly desirable, and the charge or even the suspicion of star-chamber proceedings under this practice betrays ignorance and nothing more.

SPIRIT OF MID-YEAR MEETING

It is but a few days since the American Electric Railway Association met at Washington to count among its speakers two leading members of the House of Representatives, one member of the Senate and the President of the United States; yet, viewed even in the short perspective of a week, it seems clear that this meeting marks a definite step toward a better understanding between regulators and regulated. When the American Electric Railway Association adopted as a body the now-famous Code of Principles it cast off to the last vestige the slough of foolish secrecy with which it had been so long encumbered. It was just as necessary that the chosen representatives of the people should declare themselves with like directness. It was the spirit of publicity and co-operation which prompted the selection of Washington as the meeting place, and it was this spirit which animated the entire convention. It is true that neither the address of the President nor the speeches of Senator Weeks and Congressmen Sherley and Montague bore directly on the specific problems of the electric railway industry. But all of them expressed the spirit of aid instead of enmity, of future co-operation for past antagonism. Each party has cried *Peccavi* and each party has promised hereafter to seek the other's good instead of the other's ill. And what is the panacea? Is it publicity alone, full and frank as that may be? No, the stronger medicine of common honesty, of square dealing, of recognition of mutual obligations is needed as a purge to cleanse both our public and private bodies of the toxins with which they have been too long poisoned. The American Electric Railway Association through its Code of Principles has put itself clearly on record for a clean life in a clean body. May those who have promised to help the business men of the United States show in future a due respect for this declaration by imposing an equally high standard of conduct on the part of the political men of the United States.

NON-UNIONISM A BASIS OF EMPLOYMENT

In clearly establishing the fact that the renunciation of union affiliations may be demanded as a condition of employment, the decision of the United States Supreme Court last week in the Kansas Coercion Statute case has cleared this phase of the labor question in a way that should be of interest to all electric railway officials. The law in question declared that it was unlawful, as a condition for obtaining or continuing employment, to coerce or influence a person to enter into an agreement not to join or remain a member of a labor organization. The downfall of this law now carries with it similar laws in California, Colorado, Connecticut, Indiana, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oklahoma, Oregon, Pennsylvania and Wisconsin. The abolition of such laws in these states should bring the fact home to all that labor contracts are not wholly one-sided instruments. The trades union theory has always been that the employees had a right to control the acts of the employer but that the employer had no right to place equal or even similar restrictions upon the employees. Justice Pitney declares, however, that just as labor organizations have the inherent and constitutional right to deny membership to any man who will not agree that during such membership he will not accept or retain employment in a company with non-union men, and just as a union man has the constitutional right to decline proffered employment unless the employer will agree not to employ any non-union men, so the employer has the constitutional right to insist that his employees shall refrain from union affiliations during their term of employment. It will undoubtedly come as a surprise to labor advocates that employers have any constitutional rights at all along this line, for they have always been obstinately oblivious of the adage that what is sauce for the goose is sauce for the gander.

FAMILIARITY MAY BREED CONTEMPT

An experienced transportation superintendent recently brought up a point in the matter of discipline which is worth some sober thought by all who are concerned with the direct handling of men. This official found, on taking charge of the platform men on another property, that obedience to orders had become a purely optional affair with them under the late administration. In fact, when the new superintendent demanded obedience as his right, they were astonished. Some very convincing arguments in the form of direct dismissal were required to bring the survivors to their senses. Yet the men themselves had been more sinned against than sinning. The rod of discipline had been wielded so little as to seem a barbarous if not an obsolete instrument.

The trouble was that the previous superintendent had gone too far in fraternizing with the men. He was not content to be with them at an occasional smoker or picnic, but had been "one of the boys" evening after evening at a bowling alley behind a local saloon. Once he had established this intimate acquaintance the men knew his foibles far better than he knew theirs, and when he ventured to issue a disagreeable order he was simply mocked.

We are told that to make Asiatic peoples believe their kings were gods and not mere men, the commonalty were never permitted to see their king eat or drink. The disciplinary officer who wants to keep the respect of his men must also surround himself with just enough mystery to seem more than an ordinary man. The fact that he administers discipline directly makes it undesirable for him to be as familiar as the higher officers may on occasions, as they are not in close daily contact with the men. A reasonable degree of aloofness is not at all incompatible with square dealing. The separate mess for the officers of a ship is not so much a matter of snobbishness as a recognition of the fact that the officers cannot afford to display their frailties before their subordinates. To a certain degree the operating officer of a railway must follow this example, for he, too, is in an organization where implicit obedience means relatively just as much for good service as it does in the army or navy.

THE "BUY IT NOW" MOVEMENT

A prominent steam railroad official, in commenting on the business situation, said recently that if a line was drawn north and south through Chicago for a distance of 200 miles on each side of that city, and each end of the line was then extended west for a distance of 700 miles and the ends of these lines were joined so as to form a parallelogram, it would contain the most prosperous section of the world to-day.

There is no doubt that the farms of the Central West, with a wheat crop of enormous volume and selling at high war-time prices, are in a very strong financial position. This lends interest to the "Buy It Now" movement, launched from Omaha recently through the Associated Press. The campaign has extended to other cities and has attracted very favorable attention from public officials as well as from commercial organizations. The plan is well described by President Wilson, who said in his recent speech at Indianapolis: "I understand that your Chamber of Commerce in Indianapolis is working now upon the motto, 'if you are going to buy it, buy it now.' This is a perfectly safe maxim to act upon. It is just as safe to buy it now as it ever will be, and if you start buying there will be no end to it and you will be a seller as well as a buyer." Governor Capper of Kansas, in referring to the abundant crops in the Central West and the industrial depression in the East, said: "Every dollar wisely spent now tends to enliven business, to start the wheels of idle factories, to give employment to idle men and to feed the hungry. The farmer can not only buy now to better advantage than later, but he can perform a patriotic duty by paying every indebtedness promptly and by purchasing his spring supplies at the earliest possible moment, 'Buy It Now.'" Governor Hammond of Minnesota, another prosperous state, in a recent interview spoke along similar lines.

But the movement is not confined to the agricultural sections of the country. The Baltimore & Ohio Railroad has expressed itself as in full sympathy with such a movement and is showing it by placing an order for 2000 new freight cars, the first order for equipment that has been placed by the company in more than a year. In its official statement it says in part: "We have already purchased $385,000 worth of material in anticipation of our requirements for the next six months and are just about to enter into contracts for $200,000 worth of additional material covering the year's requirements. We suppose this is the most practical way in which we can aid your movement. We are heartily in accord with the work you have in hand."

Each industry and each company must decide for itself how far it can co-operate in a movement of this kind, but if there is to be a revival of industrial activity in this country it will necessarily mean larger gross receipts for the electric railway companies. We realize that each company has many local problems to solve, of which in most cases the best method of increasing fares is the most important, but the old rule should not be forgotten that the best time to make purchases is toward the end of a business depression, because prices are then nearly always lower than can be secured later.

MAKING THE NICKEL GO FARTHER

While the costs of all other elements of railway service have gone up that of electrical energy has gone down. More efficient engines, boilers, generators and distribution systems have effected savings in fuel, floor space, labor and incidentals, off-setting to some extent at least, increases in wages and cost of materials. It has thus been possible to make the cost of the energy for operating a car a small and decreasing proportion of total operating cost, occupying the order of approximately one-seventh of the total. Small as it is, however, it offers one opportunity at present for saving or, as suggested above, for making the nickel go farther in other directions, preferably at present in the line of better dividends.

The unit cost of electrical energy is now about as low as we can reasonably expect to get it, and it is probable that future improvements will take care of increasing unit costs, but not much more. We must then look for further economies in the use of energy rather than in its production. Here is a fertile field as one realizes when he calculates the difference between the energy necessary in overcoming friction in moving a car between two points and that drawn from the trolley. Figures quoted on page 231 of last week's issue showed that rolling friction in freight trains at slow speeds may be as low as 26 watt-hours per ton-mile. On the other hand, an electric street car may often use 150 watt-hours. The difference between these figures is worthy of careful study. It does not all represent waste, however, for a considerable part is incidental to maintaining a reasonable schedule speed with frequent stops.

An energy consumption of 150 watt-hours per ton-mile would occur only in high-speed city service with frequent stops. It might be roughly divided thus: Absorbed by all friction except in brakes and motor losses except resistance, 63 watt-hours, or 42 per cent; absorbed in brakes, 60 watt-hours, or 40 per cent; loss in starting grids, 25 watt-hours, or 16 2/3 per cent, and motor-resistance loss, 2 watt-hours, or 1 1/3 per cent. In heavier service with less frequent stops the energy consumption might be 100 watt-hours per ton-mile, of which friction (including air resistance) might absorb 78 watt-hours; brakes, 15 watt-hours; resistance grids, 5 watt-hours, and motor resistance, 2 watt-hours. These figures, which are approximate only, indicate at a glance the possible lines of improvement. In operation more coasting gives lower speed at brake application and less braking loss, which is roughly proportional to the square of the speed at the instant of application. Quicker acceleration permits the same schedule to be made with more coasting and is thus conducive to saving unless carried to the extreme. This is relatively more important in service with frequent stops. In such service, also, field control of motors is successful in reducing grid losses and permitting more rapid accel-

eration owing to the strong field used in starting. After all, the most tempting opportunity for saving is probably in the line of weight reduction which produces a cumulative effect. When this opportunity has been exhausted there is still scope for ingenuity in cutting down friction.

In this issue of the ELECTRIC RAILWAY JOURNAL we print an abstract of a paper on energy saving read a few days ago in Chicago by N. W. Storer. In this he gives data which are of great interest in the light of facts such as those outlined above.

IS PLATFORM WORK "SKILLED LABOR"?

In the Bay State Street Railway arbitration of wages now proceeding at Boston, Mass., perhaps the most important point thus far discussed is whether platform work on a car should be considered skilled labor, in the usual sense of the term. Counsel for the employees' union has devoted many hours to the effort to secure admissions from the company's officials that uniformed men in the car service should properly be classed as skilled laborers, but no such admission is likely to be made for the excellent reason that the duties performed by motormen and conductors, while calling for the exercise of proficiency in the handling of equipment and in relations with the public, do not justify the classification advocated by the union.

Granted that the duties of the motorman call for quickness of perception, intelligence, facility in manipulation, the use of judgment, and some degree of mechanical apprehension, it is none the less true that the rudiments of his occupation can be learned within a comparatively few days and that these duties are, while varied as to time combination, essentially repetitive. As experience is gained, most motormen increase in proficiency up to a point which cannot be predicted as yet for the individual, but which is approximated in sliding scales of wages at from roughly five years to ten years of service, generally speaking. Much is made of responsibility by those who contend that motormen should be classed as skilled laborers, but there is no logical connection between responsibility and skill in craftsmanship, except that the latter may be a help in meeting the former. What is true of the motorman applies to the conductor also, to a corresponding degree. The latter improves with practice, but the acquisition of sufficient knowledge and proficiency to take charge of a car is a matter of a very limited time in comparison with the many months required to learn a trade sufficiently well to be of substantial value as an apprentice, and to become a first-class workman is a question of years compared with the time demanded to become an excellent conductor.

None of these comments is intended to belittle a class of men whose faithfulness to duty, forbearance under trying conditions, adaptability to a service which constantly changes in volume if not in form, and whose patient, helpful work meets a need of the world which calls for ability, physical strength and intelligence in all sorts of weathers and in the face of many obstacles. But there is no blinking the fact that the occupation of a uniformed man on a modern street railway is one which can be passably well performed after a period of training which is one of the shortest required of intelligent workers in modern industry; not as well performed, of course, as after extended experience, but still acceptable enough to warrant putting a man on a car in charge of its passengers or its equipment surprisingly soon after his acceptance as an employee. Counsel for such employees are fond of referring to an electric car as a "highly complex locomotive" operated on the public highways, but while the complexity of the equipment may be admitted, the fact that the motorman's relations to it are almost entirely manipulative tells its own story. We may go so far as to grant that the quality of skill may be attained in the work of both motorman and conductor—skill increasing with time—but the officials of the Bay State company are fundamentally right in refusing to class the work of uniformed men with that of cabinet makers, machinists, masons, plumbers, printers, or other wage earners whose duties require for successful performance long and arduous preparation and whose compensation corresponds to the superior degree of skill of mind and hand demanded by their vocations.

CHANGE COLOR AND SAVE MONEY

A prominent superintendent of car equipment recently stated in conversation that if he was permitted to make an unrestricted choice of the shades of color with which his cars were painted he could save $5 per car at each painting without changing the quality of the work. The point is an interesting one. Of course, the economy is somewhat petty, but during the present lean years in electric railway affairs it can hardly be neglected on this score.

As a matter of fact, on any railway it is quite possible that a change in color might even appeal to the taste of the public more than a retention of the old hues. Indeed, it seems off-hand that there is no known color, except perhaps pink, that is not used for the street cars in at least one of the many cities in the country. Greens and reds, of course, predominate, but blues and browns and yellows have many supporters, and if any certain color can be accepted by the people of one city it is hardly reasonable to suppose that those of another community cannot stand a change to the same color.

In general, the selection of the color scheme for electric cars seems to be one of the few duties that railway presidents are absolutely unwilling to transfer to the shoulders of their less gifted subordinates, but when the president has made a decision regarding a color scheme, the time and effort that have been devoted to it are worth, from an artistic standpoint, exactly nothing. Any other color, if well maintained, would impress the riding public just as favorably, and the impression on the public is, so far as we can see, the only reason for painting cars with anything better than the rough but cheerful red made familiar through its universal use on barns and box cars.

Naturally, this should not be construed as an argument in favor of such a grade of paint for street cars. Electric railways owe it to the communities they serve to provide neat-looking equipment, and to this end the so-called "coach colors" are no doubt necessary because of their body and susceptibility to high finish. On the other hand, the railways are not obligated to make their cars look like the proverbial Joseph's coat. Therefore the cheapest and most durable of the coach colors would be the most satisfactory from the railways' standpoint, and it ought to be as uniformly used for street railway service as is box-car red for freight trains or "Pullman color" for sleeping cars. The opportunity for economy is definite enough, because the prices of the numerous coach colors in general use vary through a range of several hundred per cent, and the steps upward from the undefineable greenish-brown that is known as "Pullman color" through the dull yellows, the greens, the blues and the light reds are sufficient to make the latter prohibitively costly in comparison with the former.

It has been said by one of our correspondents that nothing that a manufacturer could do would cause a railroad, either steam or electric, to make a change from its standard color scheme. This would probably be true if the use of a new color could not be made to show an advantage either in lasting quality or in cost, but when a tangible result can be attained the difficulty of overcoming the railroads' conservatism ought not to be insurmountable. What is needed is that the manufacturers' specialists in color-mixing shall be called upon to point the way toward the least expensive combinations and not be told, as they are now, to make quotations upon colors that are arbitrarily selected without regard for cost or durabiilty.

TREND OF ELECTRIC RAILWAY EARNINGS

In our issue of Jan. 23 we published an abstract of the report just given out by the bureau of fare research on the subject of electric railway statistics for June, July, August and September of 1914. The data submitted only serve to confirm the evident fact that the year 1914, with its accumulating gloom of business and financial depression and the European War, was not conducive to electric railway prosperity. That electric carriers did not suffer more than they did was entirely owing to the necessary character of the commodity furnished by such carriers and the careful administration by their officials.

It may be recalled that this paper, in its issue of Nov. 28, page 1217, compiled the earnings of all companies making public reports for September, 1914 and 1913, and that the result showed a total decrease in gross earnings of 1.4 per cent and in net earnings of 2.24 per cent, or, if Western returns were eliminated on account of meagerness, 0.87 per cent for gross earnings and 1.24 per cent for net earnings. These figures were static, in a sense—that is, the month of September in both 1914 and 1913 was lifted away from the remainder of the months and an analysis made as of those two particular months. The data, however, compiled by the bureau of fare research for the four months of 1914 are in running form. They lack the feature of comparison with the preceding year's results, but they are of value in indicating the trend of gross earnings and operating expenses that led up to the condition in September as analyzed by this paper.

With the returns for June, 1914, as a basis, it can be seen from the bureau's figures that the gross earnings, after a slight expansion with the heavy traffic of July, gradually fell until in September they were only 96.24 per cent of the June amount. Similarly, the operating expenses, after a slight rise in July, by September dropped to 95.11 per cent of the June total. A considerable portion of the decreases was undoubtedly caused by the seasonal variations in traffic. Yet if, as the bureau points out, the earnings for June and July from year to year are substantially equal to those of August and September, the two middle months being most affected by these seasonal variations, then it seems that in this section of 1914 certain depressing influences were at work, for the returns of the last two months failed to keep up to the stated standard of the first two months. This is not at all surprising, however, for the increasing tightness of business and finance, the closing down of industrial plants and the cutting off of employee traffic that followed the outbreak of the European War in August may justly be considered to have retarded the seasonal traffic that might logically have been expected in August and September.

What, then, do the data really show? Simply that the static condition given by this paper for the month of September was mostly a result of influences which, beyond the control of the electric railways, accumulated the decreases in gross and net earnings over a period of at least four but particularly two months. Incidentally, too, it may be remarked that the statistics bring out the effect upon net earnings caused by slight reductions in gross earnings. Under normal conditions an increase in gross earnings is a greater financial advantage than a proportionate decrease in operating expenses. The reason for this is that a large part of the operating cost is fixed and does not fluctuate in accordance with the amount of business done, so that a greater net return is caused by an extension of the revenue-producing power than by a reduction in expenses. It follows, therefore, that a decrease in gross earnings is more detrimental to a carrier than a decrease in operating expenses; for the latter cannot as a rule be decreased to the same extent and may be simply deferred, with the result that the small margin of profit on which the company is operated and its rate of return may be seriously impaired. This state of affairs is mentioned in the bureau's report, but, as before, we find solace in the fact that the causes are external and not likely to be permanent. It will undoubtedly require time for electric railways to be restored to their former basis of prosperity, but individuals in all sections of the country who are keeping their fingers on the pulse of business are predicting a general revival, from which electric railways, of course, will secure their share of benefit.

New Cars for New Orleans

These Cars Combine All of the Most Modern Developments in Design, Having Fully-Inclosed Platforms Arched Roofs with Ventilators, All-Steel Construction Except for Wooden Sheathing on Roof and Floor, and a Novel Form of Pressed-Steel Carline Which Fits into the Hollow Side Post

The New Orleans Railway & Light Company has just placed in service a lot of fifty cars of a type which may become standard for this property. The new design constitutes a radical departure from the practice that has heretofore been the rule in Southern cities, as the frame construction is all-steel, only the roof sheathing and floor being of wood. In addition, plain-arched roofs equipped with ventilators have been adopted as well as fully-inclosed platforms without bulkheads. Altogether, the design constitutes an excellent example of the most modern developments in surface-car construction.

As shown in the accompanying reproductions of progress photographs, the construction gives the impression of being much more substantial than usual for standard city service. The desire of the designers to reduce maintenance to a minimum is, in fact, manifest throughout, and the utmost simplicity of construction has been made the rule, filler blocks and other parts that form no essential part of the structure having been rigidly eliminated. The desire to reduce maintenance expense has even resulted in the adoption of two-motor equipments with 55-65-hp motors and 30-in. wheels in preference to four of the so-called baby motors with 24-in. wheels, notwithstanding the fact that the advantages of a low floor were fully recognized by the designers. In this case the cost of up-keep for two large motors was considered to be enough less than that for four small ones to offset the saving in weight and floor height effected by using the latter.

The combination of substantial construction and ease of maintenance at which the designers aimed is exemplified by the post and carline design. Both posts and carlines have been made of pressed-steel members, the carlines fitting into the tops of the posts and being rigidly riveted to them. In consequence the posts and carlines form a series of continuous members extending around the superstructure from one side sill to the other, a construction that has heretofore been used only in connection with light, continuous T-bars.

Notwithstanding this substantial construction, however, the elimination of unnecessary parts and the general utilization of the full strength of the various members has resulted in a total weight of only 36,100 l This weight does not include heaters which are n needed in the mild climate of New Orleans, and in com parisons with the weights of other cars an allowanc should be made for this. Nevertheless, that the car of large size for the unusually light weight is show by the following table of general dimensions:

Length over corner posts	34 ft. 8 in.
Length over bumpers	47 ft. 8 in.
Width over all at window rail	8 ft. 7 in.
Width over eave mold	8 ft. 5¾ i
Height from top of rail to top of trolley board	11 ft. 3⅝ i
Truck centers	23 ft. 5¼ i
Wheelbase of truck	4 ft. 10 in.

GENERAL ARRANGEMENT

The car is provided with eighteen cross-seats of th Walkover type, and there are four stationary longitud nal seats at the ends of the car, each holding four seate passengers, giving a total seating capacity of fifty-tw

To provide accessibility the body has been hung



NEW ORLEANS CAR—GENERAL VIEW OF CAR, SHOWING ELIMINATION OF ORNAMENTAL PAINTING

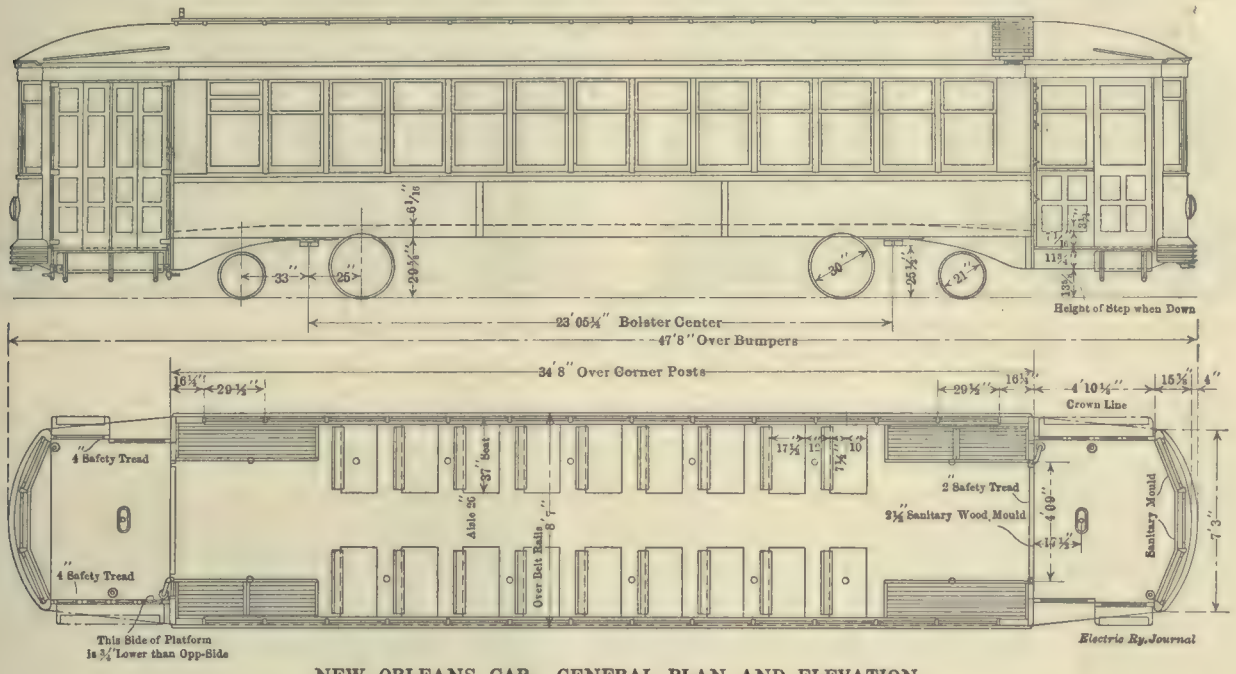
low as possible over the 30-in. wheels. The first ste is 13⅝ in. from the rail level and the second step to th level of the platform is 11 in. A 7¾-in. step brings th passenger to the car floor at the end sill, and a ramp c 3¼ in. extends from this point to the bolster, makin the total height of the floor 35⅝ in. above the rail, with out passenger load.

The inclosed platforms at both ends of the car ar 6 ft. 2 in. long from front of vestibule dash to corne posts, and 7 ft. 3 in. wide over vestibule corner post No bulkheads are installed, and the longitudinal seat at the ends of the body provide large floor spaces ac joining the platforms. Three seats on each side of eac end of the car are fitted with brass sockets in the sea backs for the reception of the race-division, or "Jim Crow," signs. This arrangement gives flexibility an convenience in allotting the space allowed for colore patrons, who are assigned to the rear of the car r

gardless of its direction. The main aisle is 26 in. wide between seat ends and 29 in. wide between seat backs. The aisle space at the longitudinal seats is 57 in.

Each platform is provided with double folding doors on the entrance side and a single sliding door on the exit side. All doors are inter-connected with their respective steps so that upon closure of the door its step is folded simultaneously, Burdette-Rountree mechanisms being used. The entrance or folding doors give a clear opening of 54 in., this opening being divided into entrance and exit portions by the installation of a vertical, white-enameled stanchion approximately in the center of the space. The door operating stand is located on the center line of the car and 11½ in. from the end sill, leaving room for the conductor to stand between it and the end sill. Portable and adjustable seats are furnished for both conductor and motorman.

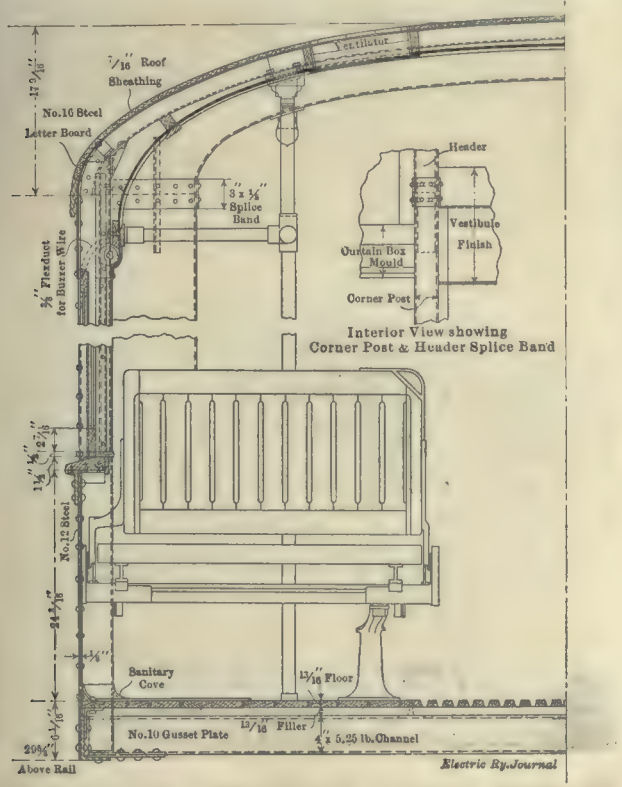
Enameled stanchions are provided at the entrance archway at the usual bulkhead location and also at the entrance and exit doors. The latter stanchions are so placed as to encourage passengers to take the proper hand hold in boarding and in alighting, and thus accidents arising from this source are minimized. Instead of hand straps in the body of the car, white-enameled tubing is arranged over the longitudinal seats in a horizontal position and in a convenient location for hand holds. The enameled hand-holds and stanchions are coated with a glass-hard material that is baked on at high temperature, these having been furnished by the Ellcon Company.



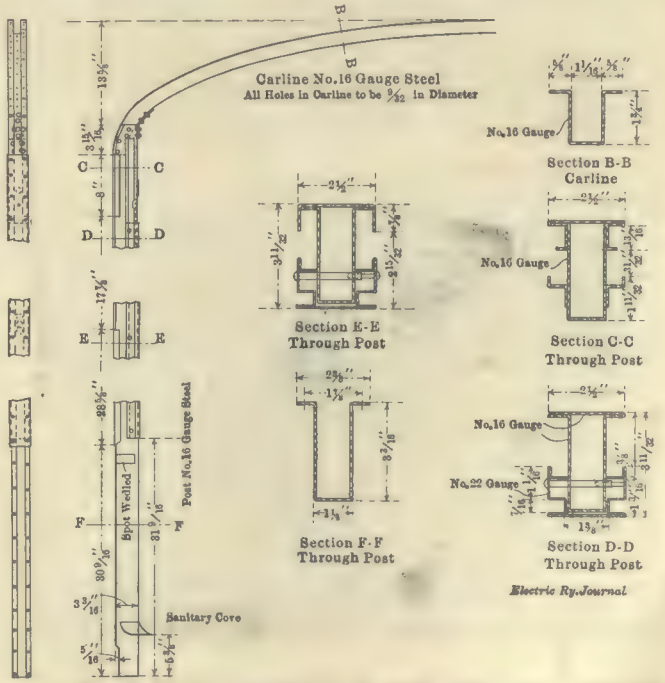
NEW ORLEANS CAR—GENERAL PLAN AND ELEVATION

STEEL CONSTRUCTION

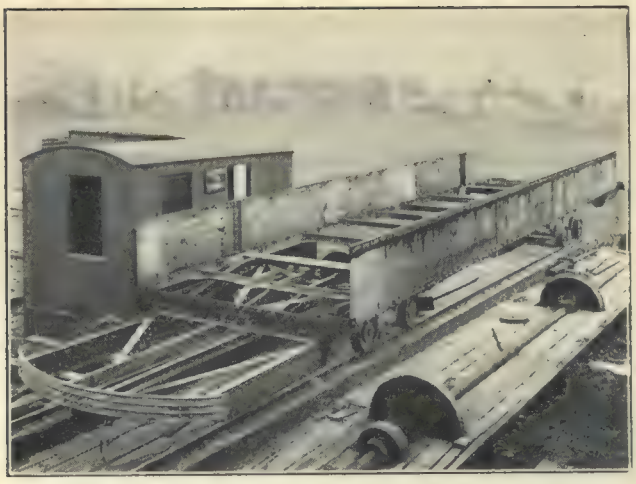
With the exception of floor and roof, the car is built of steel throughout. The underframe consists of two



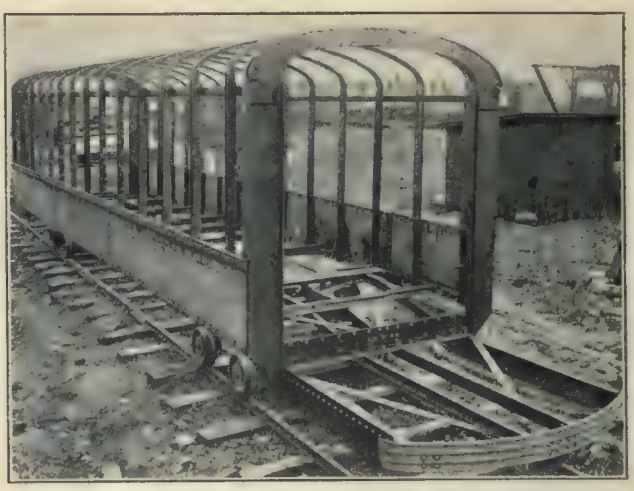
NEW ORLEANS CAR—CROSS-SECTION, SHOWING DETAILS OF SIDE CONSTRUCTION



NEW ORLEANS CAR—DETAILS OF SIDE POST AND CARLINE CONSTRUCTION



NEW ORLEANS CAR—SIDE GIRDERS AND FLOOR FRAMING BEFORE INSTALLATION OF POSTS



NEW ORLEANS CAR—SUPERSTRUCTURE FRAMING, INCLUDING PANELS AND HEADER AT END OF BODY

side-girders made up of No. 12 gage steel plates, which are 30-in. wide and 34 ft. 8 in. long when assembled. The top member of this girder is a 3½-in. x 1-in. x ⅜-in. dropper bar, and the bottom member is a 4-in. x 3-in. x 5/16-in. angle. Two splice plates are introduced in the length of each girder, and reinforcement against buckling is provided at the bolsters by means of 4-in. x 5-in. x ⅜-in. angle and a 4½-in. x 3-in. x ⅜-in. vertical tee, securely riveted to the girder web. The bottom member at the side of each girder is bent inward at the end sill and the two members meet at the center line of the car, where they are spliced together to form the end sills. In addition, a 3/16-in. x 9½-in. plate is securely riveted to the above-mentioned angles and this is reinforced on the bottom with a 3½-in. x 2½-in. x ¼-in. angle.

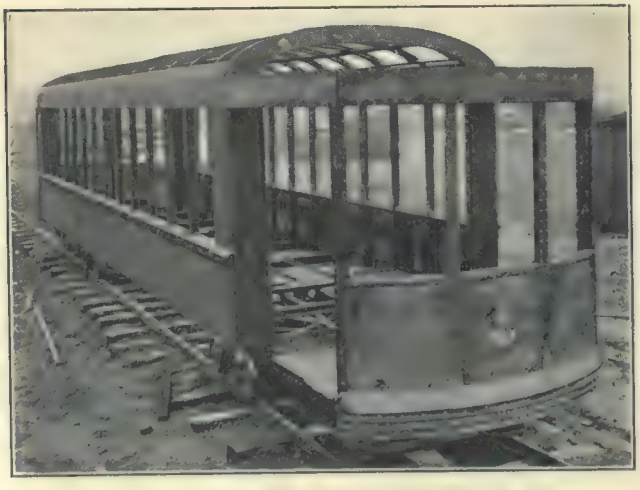
Frequent crossings composed of 4-in., 5.25-lb. channels fasten the two girders together and provide a support for the flooring, and the underframe is further stiffened by the use of diagonal members consisting of 2½-in. x ¼-in. steel bars. Generous gusset plates also are fastened to bottom angle and crossing channels. The top angle of the girder is covered with an oak window rail which also furnishes an arm rest on the inside of car.

The main platform knees are made up of a flat plate of No. 10 gage steel cut in a concave-wedge shape and reinforced on one side by means of 2½-in. x 2½-in. x ¼-in. and 3½-in. x 2½-in. x ¼-in. angles. These platform knees are securely riveted to the end sills and to the cast-steel body bolster, no bolts being used, and the outer ends are riveted to a 7-in. section of channel-shaped Hedley anti-climber which serves in place of the usual crown pieces. The auxiliary platform knees consist of 4-in. channels bent to the proper shape and riveted to the end sill and bolsters.

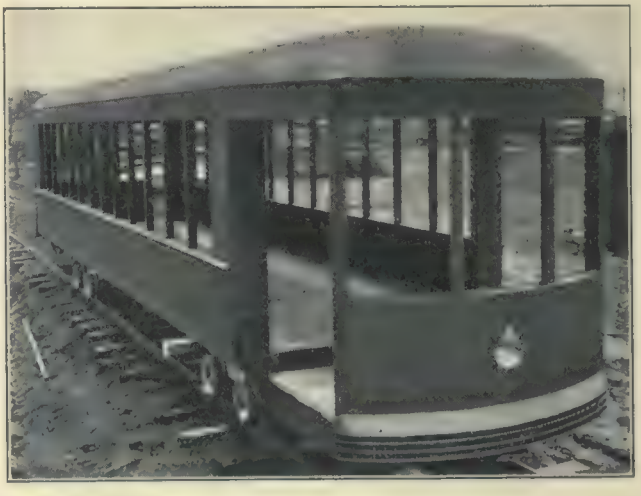
The car posts are unique. They are made of No. 16 gage steel plate which is pressed into a "U"-shape, the flanges of this being securely riveted to the side girder. The outside of each post above the side girder is covered with a No. 16 gage plate that is riveted to the flanges of the "U." The inside of the post is covered with No. 18 gage sheet steel that is molded into proper form to take the rack for the window fasteners and to provide runways for the curtain fixtures. This molding is fastened to the post by means of hollow screws.

The carlines also are composed of pressed "U" shaped sections and they are securely riveted and bolted to the tops of the posts, the carlines fitting inside of the posts and thus forming a practically continuous member extending from one side of the car to the other. The end headers and corner posts consist of pressed steel sections of a deep "U"-shape. These are riveted together at the spring line of the arch of the header and are further riveted to the pier panel which extends between each corner post and nearest side post. The headers are covered with wooden furring strips and the roof boards are through-bolted to these furring strips and to the flanges of the carlines.

The vestibule posts are all of pressed steel, the two



NEW ORLEANS CAR—STEEL FRAMING COMPLETE, INCLUDING LETTERBOARD AND VESTIBULE SHEATHING



NEW ORLEANS CAR—CAR STRUCTURE COMPLETE WITH FLOOR AND ROOF SHEATHING APPLIED

center posts being made in one section of No. 16 gage steel and the corner vestibule posts in two sections of No. 12 gage steel securely riveted together. These posts are bolted to an angle-iron sprung to the proper radius and fastened to the crown piece. The vestibule is made of No. 16 gage sheets bolted to the outside of the vestibule posts, and there is also a lining plate on the inside of the vestibule posts, which provides pockets into which the sash may lower. The outside of the vestibule is provided with the usual bumper shield.

The letterboard is continuous throughout the whole length of the car body, and it is reinforced between posts with a ¾-in. x ¾-in. x ⅛-in. angle. It is 16 in. wide and is not only riveted to the posts but is bent over onto the arch of the roof and riveted to the carlines to stiffen the roof framing transversely. The vestibule top plates consists of a 2½-in. x 1½-in. x ¼-in. angle continuous from body corner post to body corner post.

Finish and Interior Fittings

The floor consists of tongued-and-grooved yellow pine, laid lengthwise of the car and depressed at the aisle section so that the top of the floor-mat is level



NEW ORLEANS CAR—INTERIOR VIEW

with the top of the floor at the side seats. The floor mats consist of narrow strips of maple screwed to the flooring. The roof consists of ½-in. tongued-and-grooved poplar through-bolted to the carlines and covered with No. 8 canvas duck.

The drip rail is made up of wood and bolted to the letterboard. The canvas of the roof comes down over the upper part of this drip rail and is tacked to it with copper tacks, following steam railroad practice. This drip rail is continuous around vestibules. The curtain box is formed of No. 22 gage steel that is divided into sections each covering one curtain and arranged for ready removal for access to curtains and fixtures.

Headlining has been installed notwithstanding the wooden roof sheathing because of the extreme heat of the summer sun in New Orleans. It consists of 3/16-in. agasote separated into convenient sections, the joints being covered with light cherry molding, and this molding matches the molding which carries the lighting wires through the body of the car. The usual space is, of course, allowed for advertising cards. The bottom sash is arranged to raise so as to give a clear opening of 27½ in. but the top sash is stationary and is fastened to the post caps with screws installed from the outside of car.

The interior finish is dark cherry color throughout, but the headlining is painted light green. The interior of the car has been rubbed down to a dull finish after varnishing and it presents a very neat and attractive appearance, the finish of the steel making a very good match with the woodwork of the seats and moldings. The outside of the car is painted a light olive green, and, as will be noticed in the accompanying illustration, all unnecessary ornamentation has been rigidly eliminated. The only striping or lettering appears on the dash, and this consists of the car number and an aluminum stripe around the edge of the dash plates.

Ventilation is provided by means of eight Railway-Utility suction ventilators. The seats are of the standard Hale & Kilburn No. 300 type, fitted with wooden cushions and backs. A Consolidated push-button system is installed for signaling the motorman. The side curtains are of pantasote fitted with Forsyth Rex type rollers and No. 88 ring fixtures. Motorman's curtains are also installed. Keystone signs are located in the center vestibule sash at each and in the rear side window, the boxes for these signs being made of steel in all cases. Crouse-Hinds headlights and Earle trolley catchers are also provided. A double-fare International register is located at one end of the car and this is operated from either end by means of a register rod installed in the center of the car close to the headlining. The bell cord to the motorman's signal bell is run in conduit above the headlining.

The lighting layout provides four circuits of five lights each, giving a total of twenty 23-watt tungsten lamps. A very neat and convenient arrangement for the light switches is provided by the installation of a switch cabinet in the pier panel of the No. 1 end of the car. The door of this cabinet is flush with the interior trim and it contains all the switches except those for the compressor, the latter being located on the dash convenient to the motorman. The compressor switches are wired in parallel so that passengers on the rear platform cannot inadvertently cut off the compressor circuit.

Weights and Propulsion Equipment

The service conditions under which these cars operate are as follows: Schedule speed 10.8 m.p.h.; average stops per mile, 7.25; average duration of stops, 4.5 seconds; average line potential, 510 volts; rate of accelerating and braking, 1.5 m.p.h.p.s.; average passenger load, 4500 lb. The total weight of the car, fully equipped and ready to run, is 36,100 lb., or 694 lb. per seat. This weight is made up as follows:

Two maximum traction trucks complete with wheels, axles, frame, boxes and brake rigging	10,700 lb.
Electrical equipment on trucks consisting of motors, gears and gear case	5,800 lb.
Electrical equipment on car body, including controllers, cables, circuit breakers, trolley bases, poles, etc.	1,400 lb.
Air and hand-brake rigging	1,800 lb.
Car body complete, including all accessories	16,400 lb.

The trucks are of the Brill 39-E, maximum-traction type. They are fitted with 30-in. driving wheels and 21-in. pony wheels, and have a wheelbase of 4 ft. 10 in. The driving axles are heat-treated, association standard, E. B. type, while the trailer axles are of 4-in. diameter and are made in accordance with Pennsylvania Railroad standard. The wheels have the association standard, *B*, tread with ⅝-in. flange and 2½-in. tread. The wheels are of the single plate type and are made of cast iron. The truck bolster is provided with an auxiliary spring placed between it and the elliptical side spring which provides easy riding under conditions of partial load. The journal boxes are of the Brill type and are made of semi-steel.

The car is equipped with two General-Electric 201-I motors of 55-65 hp, the gear ratio being 15-71. The controllers are GE standard K-36-J. All power wiring is carried in conduit. Grade "M" solid gears and pinions are used, the face of gears being 5-in. These are pressed on the axles at approximately 60-tons pressure.

Two electrolytic lightning arresters are provided in connection with the usual kicking coils. Type MR circuit breakers, RG rheostats, U. S. No. 13 trolley bases and GE trolley poles, harps and steel-sided, copper-centered trolley wheels complete the electrical equipment.

The car is fitted with complete straight-air brake equipment consisting of a Westinghouse DIH 16-ft. air compressor, a 16-in. x 60-in. reservoir, a 10-in. x 12-in. brake cylinder and a Type E automatic slack adjuster. The body and truck-brake levers are so arranged as to give a braking pressure of 75 per cent of the load on the pony wheels and 85 per cent of the load on the motor wheels, these pressures being considered to meet the service conditions at New Orleans satisfactorily. Hand brakes arranged with double floating levers and Dayton ratchet-type brake handles are also installed.

Design and Construction

The general features of the new car's design were planned by a committee composed of B. F. Wood, vice-president and chief engineer, United Gas & Electric Engineering Corporation, engineers for the railway; L. C. Datz of the same company, J. S. Pevear, president New Orleans Railway & Light Company, and M. S. Sloan, general manager. The cars were built by the Southern Car Company at High Point, N. C., under the supervision of Bronson A. Smith, engineer for the United Gas & Electric Engineering Corporation.

Northern White Cedar Association

Twenty firms producing white-cedar lumber and poles were represented at the nineteenth convention of the Northern White Cedar Association held at Minneapolis, Minn., on Jan. 26 and 27. L. A. Page, Jr., president of the association, stated in his official address that general business conditions during the last twelve months had worked a severe strain on the white-cedar industry, and that the stagnation produced by the European war will continue to hold up business in all lines for some time to come. A gradual awakening of business is, however, in sight, but when this comes the short pole and post trades would be affected first. A study of pole stocks now on hand indicates an ample supply to take care of the probable demand.

The committee on publicity, of which H. S. Gilkey is chairman, reported that during the year just closed the association has carried on a campaign to interest and instruct users of white cedar. The practice of making exhibits will be extended during the next year to include conventions and local fairs. The report of the secretary, which followed, referred to extensions of freight rates and exchange of credit information among the association members.

The report of the committee on "war on substitutes" for white cedar suggested means of securing closer co-operation between pole producers, distributers and users. The importance of shipping to customers only first-class stock, thereby establishing a standard of excellence for white-cedar products, was emphasized by several speakers. The railroad committee stated that the matter of increasing the allowance for stakes used on open cars was soon to be brought before the Interstate Commerce Commission for a formal hearing.

At the close of the convention the following officers were elected for 1915: President, L. A. Page, Jr., Minneapolis, Minn.; vice-president, H. F. Partridge, Minneapolis, Minn.; treasurer, H. B. Thomas, Manistique, Mich.; secretary, N. E. Boucher, 743 Lumber Exchange Building, Minneapolis, Minn. Directors: J. E. Gerich, Milwaukee, Wis.; M. J. Bell, Minneapolis, Minn.; William Patch, Menominee, Mich., and L. A. Furlong, Minneapolis, Minn.

German 1500-Volt D.C. Line with Regeneration and Battery

The Wendelstein Railway is a mountain line of Bavaria only 9.3 miles long but notable as Germany's first 1500-volt d.c. railway. Of even greater interest is the circumstance that regeneration was adopted in connection with a storage battery, because the output of available hydroelectric power alone falls below the regular energy requirements.

The plant contains one 184-kw and one 330-kw Pelton turbo-set. The larger unit drives a 100-kw, three-phase machine which generates energy at 5000 volts for industrial purposes; it also drives a 200-kw machine which delivers 1500 volts direct current for traction. The smaller or reserve unit may be used as a motor in emergencies, at which time it is operated from another distribution system to drive a second pair of three-phase and d.c. generators. A Pirani set is also used with the storage batteries to smooth out variations in voltage and assist in returning regenerated energy.

The 721-cell storage battery furnished by the Akkumulatoren Fabrik A.G., Hagen, Germany, is of 100 amp-hr. capacity and is the first in Germany to deliver 1500 volts. This battery is divided in two parts, one section being on the ground floor and the remainder on the floor above. The lower section is grounded in the negative circuit of the railway, which gives it a difference of potential of 750 volts against ground. This voltage is easily cared for by the standard insulation of the accumulators. The cells of the other half, however, are doubly insulated against the floor, the walkways also have double insulation, and a stockade of wooden laths extends all the way around the room to prevent contact with the metal trim of windows and walls.

The rolling stock comprises one locomotive and two trailers, accommodating a total of 100 passengers. The two 750-volt motors on the locomotive are of shunt type to permit regeneration and are connected in series. The drive is arranged for both adhesive and rack rail traction. Special resistances are used to absorb regenerated energy should connection with the overhead line be temporarily interrupted. On each motor shaft is mounted a spring brake which may be manually released from the motorman's cab. Air brakes are also used. A regulator automatically applies the brakes and opens the circuit when the desired maximum speed is exceeded. Lighting is furnished at 110 volts from a motor-generator set.

The overhead line is carried at a height of 13 ft. to 16 ft. 4 in., with duplicate vulcanite and porcelain insulators. The line is not carried from either the ordinary bracket or span construction but from a wooden imitation of bridge construction. In other words, an H is formed by three poles, the horizontal member of which is braced by a diagonal connection with each vertical pole. Feeder capacity is furnished by a second trolley wire. Although no catenary suspension is used, tension take-up devices are installed every 980 ft.

The track is of meter gage and is 9.3 miles long. The train starts at Brannenburg 1548 ft. above sea level, and within one hour climbs to a height of 5650 ft. at a point only 262 ft. below the peak of the Wendelstein. Despite tunnels and retaining walls it was necessary to build part of the rock rail sections on a grade of 23.5 per cent.

The President, the Newspapers and the Association

Mr. Wilson's Address Before the Mid-Year Meeting Treated by the Press as an Important Political Message—Verbatim Report of Address with Comments from Leading Newspapers in Different Parts of the Country

The ELECTRIC RAILWAY JOURNAL for Jan. 30 carried an extended report of the 1915 mid-year meeting of the American Electric Railway Association. However, the fact that the meeting was held on Friday, Jan. 29, made it impracticable to publish in full President Woodrow Wilson's address. It was therefore decided to publish this address verbatim in the succeeding issue of this paper. But the remarkably large amount of comment from the daily newspapers also make it worth while to quote in whole or in part a few of the editorials elicited by the President's statement of administration policy. The editorials received to date include newspapers as far west as St. Louis. However, as the full text of the address was distributed by the Associated Press there is every reason to believe that the same degree of publicity was secured in the Farthest West as in the Nearest East.

THE PRESIDENT'S SPEECH

"Mr. President, Ladies, and Gentlemen: It is a real pleasure for me to be here and to look this company in the face. I know how important the interests that you represent are. I know that they represent some of the chief channels through which the vigor and activity of the nation flow. I am also very glad, indeed, to have you come and look at some portion, at any rate, of the government of the United States. Many things are reported and supposed about that government, and it is thoroughly worth your while to come and see for yourselves.

"I have always maintained that the only way in which men could understand one another was by meeting one another. If I believed all that I read in the newspapers, I would not understand anybody. I have met many men whose horns dropped away the moment I was permitted to examine their characters.

"For, after all, in a vast country like this the most difficult thing is a common understanding. We are constantly forming get-together associations, and I sometimes think that we make the mistake of confining those associations in their membership to those who are interested only in some particular group of the various industries of the country.

"The important thing is for the different enterprises of the country to understand one another, and the most important thing of all is for us to comprehend our life as a nation and understand each other as fellow-citizens.

"It seems to me that I can say with a good deal of confidence that we are upon the eve of a new era of enterprise and of prosperity. Enterprise has been checked in this country for almost twenty years, because men were moving among a maze of interrogation points. They did not know what was going to happen to them. All sorts of regulation were proposed, and it was a matter of uncertainty what sort of regulation was going to be adopted.

"All sorts of charges were made against business, as if business were at default, when most men knew that the great majority of business men were honest, were public-spirited, were intending the right thing, and the many were made afraid because the few did not do what was right.

MUST PULL TOGETHER

"The most necessary thing, therefore, was for us to agree, as we did by slow stages agree, upon the main particulars of what ought not to be done and then to put our laws in such shape as to correspond with that general judgment. That, I say, was a necessary preliminary, not only to a common understanding, but also to a universal co-operation. The great forces of a country like this cannot pull separately; they have got to pull together. And, except upon a basis of common understanding as to the law and as to the proprieties of conduct, it is impossible to pull together.

"I, for one, have never doubted that all America was of one principle. I have never doubted that all America believed in doing what was fair and honorable and of good report.

"But the method of control by law against the small minority, which was recalcitrant against these principles, was a thing that it was difficult to determine upon. And it was a very great burden, let me say, to fall upon a particular administration of this government to have to undertake practically the whole business of final definition. That is what has been attempted by the Congress now about to come to a close. It has attempted the definitions for which the country had been getting ready, or trying to get ready, for nearly half a generation. It will require a period of test to determine whether they have successfully defined them or not, but no one needs to have it proved to him that it was necessary to define them and remove the uncertainties, and that, the uncertainties being removed, common understandings are possible and a universal co-operation.

WHAT HURTS ONE HURTS ALL

"You, gentlemen, representing these arteries of which I have spoken, that serve to release the forces of the communities and serve also to bind community with community, are surely in a better position than the men, perhaps, of any other profession, to understand how communities constitute units—and even a nation constitutes a unit—and what is detrimental and hurtful to a part, you above all men, ought to know is detrimental to all and that you cannot demoralize some of the forces of a community without being in danger of demoralizing all the forces of a community.

"Your interest is not in the congestion of life, but in the release of life. Your interest is not in isolation, but in union—the union of parts of this great country, so that every energy in those parts will flow freely and with full force from county to county throughout the whole nation.

"What I have come to speak of this afternoon is this unity of our interest, and I want to make some—I will not say 'predictions,' but to use a less dangerous, though bigger, word—prognostications. I understand that there is among the medical profession diagnosis and prognosis. I dare say the prognosis is more difficult

than the diagnosis, since it has to come first, and not being a physician I have all the greater courage in the prognosis.

"I have noticed all my life that I could speak with the greatest freedom about those things that I did not understand, but there are some things that a man is bound to try to think out, whether he fully comprehends them or not. The thought of no single man can comprehend the life of a great nation like this, and yet men in public life upon whom the burden of a certain degree of guidance is laid must attempt to comprehend as much of it as they can. Their strength will be in taking counsel of as many informed persons as possible in each department with which they have to deal; but some time or other the point will come when they have to make a decision based upon a prognosis.

"We have had to do that in attempting the definitions in law which have been attempted by this Congress, and now it is necessary for us, in order to go forward with the great spirit with which I believe we can go forward, to look ahead and see the things that are likely to happen.

PEERS INTO THE FUTURE

"In the first place, I feel that the mists and miasmic airs of suspicion that have filled the business world have now been blown away. I believe that we have passed the era of suspicion and have come now into the era of confidence. Knowing the elements we have to deal with, we can deal with them; and with that confidence of knowledge we can have confidence of enterprise.

"And that enterprise is going to mean this: Nobody is henceforth going to be afraid of or suspicious of any business merely because it is big. If my judgment is correct nobody has been suspicious of any business merely because it was big, but they have been suspicious whenever they thought that the bigness was being used to take an unfair advantage.

"We shall have to admit that it is easier for a big fellow to take advantage of you than for a little fellow to take advantage of you; therefore, we instinctively watch the big fellow with a little closer scrutiny than we watch the little fellow. But bond having been given for the big fellow, we can sleep o'nights. Bond having been given that he will keep the peace, we do not have to spend our time and waste our energy watching him.

"The conditions of confidence being established, nobody need think that if he is taller than the rest anybody is going to throw a stone at him simply because he is a favorable target—always provided there is fair dealing and real service.

"Because the characteristic of modern business, gentlemen, is this: The number of cases in which men do business on their own individual, private capital is relatively small in our day. Almost all the greater enterprises are done on what is, so far as the managers of that business are concerned, other people's money. That is what a joint-stock company means. It means, 'Won't you lend us your resources to conduct this business and trust us, a little group of managers, to see that you get honest and proper returns for your money?' And no man who manages a joint-stock company can know for many days together, without fresh inquiry, who his partners are, because the stock is constantly changing hands and the partners are seldom the same people for long periods together, which amounts to saying that, inasmuch as you are using the money of everybody who chooses to come in, your responsibility is to everybody who has come in or who may come in.

"That is simply another way of saying that your business is a public business, and you owe it to the public to take them into your confidence in regard to the way in which it is conducted. The era of private business in the sense of business conducted with the money of the partners—I mean of the managing partners—is practically passed, not only in this country but almost everywhere. Therefore, almost all business has this direct responsibility to the public in general. We owe a constant report to the public whose money we are constantly asking for in order to conduct the business itself. Therefore, we have got to trade not only on our efficiency, not only on the service that we render, but on the confidence that we cultivate.

A NEW ATMOSPHERE FOR BUSINESS

"There is a new atmosphere for business. The oxygen that the lungs of modern business takes in is the oxygen of the public confidence, and if you have not got that your business is essentially paralyzed and asphyxiated.

"I take it that we are in a position now to come to a common understanding, knowing that only a common understanding will be the stable basis of business, and that what we want for business hereafter is the same kind of liberty that we want for the individual. The liberty of the individual is limited with the greatest sharpness where his actions come into collision with the interests of the community he lives in.

"My liberty consists in a sort of parole. Society says to me. 'You may do what you please until you do something that is in violation of the common understanding of the public interest; then your parole is forfeited. We will take you into custody. We will limit your activities. We will penalize you if you use this thing that you call your liberty against our interest.'

"Business does not want, and ought not to ask for, more liberty than the individual has; and I have always summed up for myself individual liberty and business liberty and every other kind of liberty in the phrase that is common in the sporting world—'a free field and no favor.'

"There have been times—I will not specify them, but there have been times—when the field looked free, but when there were favors received from the managers of the course, when there were advantages given, inside tracks accorded, practices which block the other runner, rules which would exclude the amateur who wanted to get in. That may be a free field, but there is favor, there is partiality, there is preference, there is covert advantage taken of somebody, and while it looks very well from the grandstand, there are men whom you can find who were not allowed to get into the track and test their powers against the other men who were racing for the honors of the day.

WHAT NEW LIBERTY MEANS

"I think it is a serviceable figure. It means this, that you are not going to be barred from the contest because you are big and strong and you are not going to be penalized because you are big and strong, but you are going to be made to observe the rules of the track, and not get in anybody's way except as you can keep out of his way by having more vigor and skill than he has.

"When we get that understanding, that we are all sports and that we are not going to ask for, not only, but we are not going to condescend to take advantage of anything that does not belong to us, why then the atmosphere will clear so that it will seem as if the sun had never shone as it does that day. It is the spirit of true sportsmanship that ought to get into everything, and men who when they get beaten that way squeal do not deserve our pity.

"Some men are going to get beaten because they have not the brains; they have not the initiative, they have not the skill, they have not the knowledge; they have not the same capacity that other men have. They will have

to be employees; they will have to be used where they can be used.

"We do not need to conceal from ourselves that there are varieties of capacity in the world. Some men have heads, but they are not particularly furnished. I overheard two men one day talking about a third man, and one of them referred to his head. 'Head?' the other said, 'head? That isn't a head; that's just a knot. The Almighty put that there to keep him from raveling out.'

"And we have to admit that there are such persons. Now, liberty does not consist in framing laws to put such men at the front and say they have got to be allowed to keep pace with the rest, because that would hold the whole process of civilization back. But it does consist in saying no matter how featherweight the other man is you must not arbitrarily interfere with him; that there must be an absolutely free field and no favor to anybody.

The Rules of the Game

"There are, therefore, I suppose, certain rules of the game. I will mention what seem to me some of them. I have already mentioned one of them by way of illustration. First of all is the rule of publicity, not doing anything under cover, letting the public know what you are doing and judge of it according as it is. There are a great many businesses in this country that have fallen under suspicion because they were so secretive, when there was nothing to secrete that was dishonorable.

"The minute I keep everything in my pocket and will not show anybody what is there, they conjecture what may be in my pocket; whereas, if I turn my pockets inside out, the conjecture is, at any rate, dissipated. There is no use inviting suspicion by secretiveness. If a business is being honorably done and successfully done, you ought to be pleased to turn it inside out and let the people whom you are inviting to invest in it see exactly how it is done and with what results.

"Publicity, which is required in sport, is required in business. Let us see how you are running the game.

"Then in the second place, there is a full equivalent for money you receive. The full equivalent in service, not trying to skimp in the service in order to increase profits above a reasonable return, but trying to make the profits proportioned to the satisfaction of the people that you serve. There isn't any more solid foundation for business than that.

"If you thoroughly satisfy the people you are serving you are welcome to their money. They are not going to grudge it because they will feel that they are getting a quid pro quo—they are getting something such as was promised them when their money was asked of them.

Need of Conscience

"Then, in the third place, this game requires something more than ordinary sports. It requires a certain kind of conscience in business, a certain feeling that we are, after all, in this world because we are expected to make good according to the standards of the people we live with. That, after all, gentlemen, is the chief compulsion that is laid on all of us.

"I am not aware of being afraid of jail. I do not feel uneasy when I pass a penitentiary, but I would feel extremely uneasy if I knew I had done something which some fine, honorable friend of mine would condemn if I passed before him. I would look carefully at his eyes to see if he suspected anything, and I would feel unhappy until I had made a clean breast of it with him. That is what we are afraid of, and that is what we ought to be afraid of.

"We are sustained by the moral judgment of honorable men, and there isn't anything else in this world that I know of that is worth while. How honors must hurt a man if he feels that they have been achieved dishonorably. They then are an arrow in his heart, not a quickening or tonic to his spirit in any respect. If he feels that he has cheated the people that trusted him then no matter what fortune he piles up, they never can contribute to his peace of mind for a moment. So I say that the conscience in business is the motive spring of the whole thing; the pride of doing the thing as it ought to be done.

"I ask every man in this room who employs other men if he would not pay the best salary he has if he could be assured that the man he employed was of that quality? You know that is the sort of men you want—the men who will take a pride in doing the thing right and have a clean conscience toward you who employ them. Now all of us are employees of the public. It doesn't make any difference what our business is or how small it is, we are, so far as we get money for it, employees of the public, and our clear, clean consciences toward our employers are the basis of our success, and it goes without saying, the basis of our happiness.

The Spirit of Service

"Then, the fourth rule, as it seems to me, is the rule of having the spirit of service. I know a lot of cant is talked about that, and I get very sick of the cant, as I dare say you do, but when I talk about the spirit of service I am not meaning a sentiment. I am not meaning a state of mind; I am meaning something very concrete—that you want to see to it that the thing that you do for the public and get money for is the best thing of that kind that can be done. That is what I mean by the spirit of service.

"I have known many a man who gave up profit for mental satisfaction. I know men in this city—there are men in the scientific bureaus of this government whom I could cite—who could make very big salaries, but who prefer the satisfaction of doing things that will serve the whole community, and doing them just as well as they possibly can be done.

"I for one am proud of the scientific bureaus of this government. There are men in it of the most self-sacrificing spirit and of the highest scientific efficiency who do things on a petty salary which some other men would not do at all, because if you have to pay a man a salary to produce the best product of his brain, then he scales the product down to the salary. Here are men who scale the product up to the highest standards of scientific ideals.

"They have hitched their wagons to a star, and the star is about to lift their names above the names of the rest of us. So I say that if your earning capacity is the capacity to earn the public confidence, you can go about your business like free men. Nobody is going to molest you and everybody is going to say, 'If you earn big profits; if you have treated the people from whom you are making your profits as they ought to be treated; if you treat the employees whom you use in earning those profits as they ought to be treated; if your methods of competition are clear and above reproach; why, then, you can pile these profits as high as the Rockies and nobody will be jealous of it.' Because you will have earned them in a sense that is the handsomest sense of all.

Definition of Government

"It is in this spirit that we all ought to regard the laws, that we all ought to criticise the laws, and that all ought to co-operate in the enforcement of the laws. Government, gentlemen, is merely an attempt to express the conscience of everybody, the average conscience of

the nation, in the rules that everybody is commanded to obey. That is all they are.

"If the government is going faster than the public conscience, it will presently have to pull up; if it is not going as fast as the public conscience, it will presently have to be whipped up. Because the public conscience is going to say, 'We want our laws to express our character,' and our character must have this kind of solidity underneath it, the moral judgment of right and wrong.

"The only reason we quarrel with reformers sometimes is because they are, or suppose they are, a little more enlightened than the rest of us, and they want us all of a sudden to be just as enlightened as they are, and we cannot stand the pace. That is all that makes us uneasy about reformers. If we could get our second wind, if we could keep up the pace as long as they do, we might be able to run as fast as they do, but we are more heavily weighted with clay than they are. We cannot go as fast. And we like companionship. We want to wait for the rest of them. We do not want to be in a lonely advance climbing some heights of perfection where there is no good inn at which to stop overnight.

"Put Up, or Shut Up"

"That, gentlemen, is the homely and, I dare say, obvious lesson which I have meant to give utterance to this afternoon. I think that I understand what you are after. I hope that you understand what we are after. All I ask is that if anything is being done that ought not to be done, the fault in it be conclusively pointed out and the way to correct the mistake be explicitly shown. There is an old rule that ought to obtain in politics as in everything else and it is aptly expressed in a very homely way. It is the old rule of 'put up or shut up.'

"Some one said, 'If you wish me to consider you witty I must really trouble you to make a joke.' If you wish me to consider you wise I must really trouble you to show the goods: To show how the thing can be done; to show how it can be better done. Because nobody is fool enough to suppose that the way he has determined that the thing ought to be done is necessarily the best way to do it; but it is the best way to do it until you show a better way. That is a perfectly obvious rule. So again I say it is the rule of 'put up or shut up.' And I do not mean that in any sort of disrespect.

"The market for ideas is a highly competitive market and the rules of competition are necessarily fair. There is only one test for an idea and that is 'Is it good?' You may for the time being dress it with such rhetoric that it will look good and the best thing that is characteristic of countries like our own is that every man who has an idea is constantly invited to the platform. And there is nothing better for an idea by way of test than exposure to the atmosphere. If you let enough people hear it stated often enough it will certainly seek its proper level.

"That is the reason I believe in free speech. I have been subjected to free speech myself and it is hard to endure sometimes, because the office of the President seems to be the clearing house for original ideas. I am brought more original ideas per diem, I dare say, than any other person in the country, and, therefore, pay the penalty of freedom of speech.

"Perhaps my mind does not register original ideas readily enough, because some of them do not register at all. I am perfectly willing to admit that that is the fault of the register, not the fault of the idea. All I have to say is that if you have ideas, the register is entirely at your service."

Comments of the Press

Many Shades of Assent and Dissent Apparent in the Editorial Expressions of Leading Newspapers

The following paragraphs are extracts from the newspaper editorials on President Wilson's speech before the American Electric Railway Association from New York papers or forwarded by staff correspondents in time for use in this issue.

Philadelphia Ledger, Jan. 30—President Wilson's address to the members of the American Electric Railway Association in Washington is a reflection of one phase of his personality with which the American public have not heretofore had many opportunities to become familiar. He spoke as a man among men, and he employed the language and the similes of sport to emphasize his thought. In effect, the President told his hearers, and through them the business world, that it was up to them to play the game and play it fairly; that the process of restraint and regulation, to the formulation of which the congress has laboriously devoted itself, has come to an end; that the recent laws have furnished definitions of business ethics which represent the desire of the country, and that it is now up to business men to test those definitions fairly and to enter upon the era of prosperity which we are facing with new confidence and with an honest purpose to enter upon "a free field and no favor." With the spirit of the President's remarks there will be general agreement, but whether there has been that specific definition by law of what ought to be done and what ought not to be done in big business is a trifle doubtful. That a great deal of constructive work has been done no one will deny; the tariff has been revised, the banking system reorganized and new machinery created, and a trades commission provided for. But beyond the definition of "restraint of trade" already given by the courts it cannot be said that the new laws add anything on that point, while the trades commission is yet to begin its activities. It is some comfort to know that business is not going to be molested solely because it may make big profits.

New York Times Annalist, Feb. 1—The responsibility of the managers of a great corporation is to the public at large rather than to the group of individuals who at any given time constitute the body of its stockholders. That is true even of corporations which perform no quasi-public function. . . . The placing of the stock of a corporation upon a public market through listing it on the Stock Exchange or otherwise is in effect an invitation to the public at large to become stockholders. It thus becomes the duty of the corporation to inform regarding its affairs not only the public which has bought, but likewise the public which has not yet bought, but which may.

New York Times, Jan. 31—In his speech to the American Electric Railway Association the President told his audience that: ". . . nobody is henceforth going to be afraid or suspicious of any business merely because it is big." It has not been so during the last twenty years, particularly during the last ten years. Bigness has been a crime, the only crime proved, and the persistent attempts to punish it savagely have disturbed the industrial peace of the country, with disastrous results, in so much that the accruing loss may be fairly compared with the cost of a great war. A few months ago the President discovered that there was a new temper of the people. The new temper meant that the people had got tired of seeing corporations crucified every day, that they had found out that these endless prosecutions were really directed against themselves, that the hurt was theirs, that when business was

alarmed and capital made timid they, all the people, were the chief sufferers. It was not a new temper at all, it was a very old state of mind. Now the President calls it a new atmosphere. It is the same thing by another name. If it means anything at all, it means that the politicians have discovered that harassing the corporations is not a profitable business for them.

New York Sun, Jan. 31—In his speech to the American Electric Railway Association at Washington President Wilson said: "It seems to me that I can say with a good deal of confidence that we are upon the eve of a new era of enterprise and of prosperity." The President has been saying this for more than a year. Indeed, he has gone much further; he said that the era of prosperity had arrived and that the blindness to it was purely psychological. Apparently he was mistaken in his former utterances. The President holds that the present regime at Washington has resolved the doubts and removed the checks. It has discovered and formulated the "rules of the business game" which appear to be excellent examples of Delphic wisdom. It has given to business a liberty which "consists in a sort of parole." If business can understand the rules and apply them with exactly the same minds as the government monitors, it is as free as a babe in leading strings. It is its duty and its privilege to grow under the new tutelage, which is the new freedom. The paternal administration is determined to regulate it into the prophesied prosperity. Mr. Wilson ends by imposing in homely phrase a motto upon business, "Put up or shut up." Perhaps business may be inspired to make it reciprocal.

New York World, Jan. 30—The true American attitude toward business was admirably defined by President Wilson in a single paragraph of his speech to the American Electric Railway Association: "You are not going to be barred from the contest because you are big and strong, and you are not going to be penalized because you are big and strong, but you are going to observe the rules of the track and not get in anybody's way, except as you can keep out of his way by having more vigor and skill than he has." This is the sum and substance of the Sherman anti-trust law and of the Clayton amendment. Every business man who has any conscience at all knows whether or not he is following the rules of the game. So far as business is concerned the period of uncertainty is over, as the President has said. The rules of the game have been defined, and these rules are an expression of the general public conscience. For years the managers of big business have insisted that they could adapt themselves to any conditions if they only knew what those conditions were. This was a just complaint, but it has been met. There is no manager of a great industry in the country who does not know in a general way what is expected of him, or who does not know that nothing unjust or unreasonable is expected of him.

Indianapolis Star, Feb. 1—Business has been pilled and potioned, inspected and dissected, expurgated and objurgated, fletcherized and exorcised, drawn and quartered—literally quartered. Now it is lectured. Like an incorrigibly naughty boy it is led by the ear to a front seat where, fidgety and forlorn, it must await the privacy of after-school hours when teacher will inflict a personally conducted course in deportment. For the precepts business must pretend to be thankful and duly exalted. It must receive them with submissive head and not a sign that it has done better by the President's code of morals than he has himself. He exalts the virtue of publicity for business, but business dare not make reply that while it has never sought other than publicity, a Democratic national administration has made secrecy its rule of conduct in caucuses, in legislation, in the violation of civil service, in Mexico, in foreign affairs and everywhere. No historian, not even Woodrow Wilson, records a more striking absence of publicity in government than has existed at Washington since March 4, 1913.

Indianapolis News, Jan. 30—In his address before the American Electric Railway Association the President spoke of what had been done by Congress to clear the business situation, and undoubtedly progress has been made. The trouble had, he thought, been due to the fact that men for the last twenty years had been "moving amongst a maze of interrogation points." They have not, however, as yet got wholly out of the maze, though we believe they are making progress. One interrogation point it is within the power of the President to sweep from the path, and that is an extra session of Congress. That is something which business and the people generally do not want. . . . The temper of the speech is excellent, and there is much in it that can be heartily commended.

St. Louis Globe-Democrat, Jan. 31—Many portions of President Wilson's speech to the convention of the American Electric Railway Association are subject to criticism, but his statement that he has met many men whose horns dropped away the moment he was permitted to examine their character is filled with truth. Most of the prejudices of the world are based on misunderstanding. Knowledge is the greatest dehorner extant. If our people might meet each other oftener in friendly intercourse there would be a better mutual understanding. Railway travel and our mail service have done much to remove sectional prejudices. The meeting of our representatives in Congress has had the same effect. The country has often marveled at how the fiery utterances of Senators have been tempered by a brief association with the men whom they once held up to obloquy and shame.

Buffalo News, Jan. 30—In his speech yesterday before the American Electric Railway Association the President said that henceforth nobody is going to be suspicious of any business just because it is big. It is evident that the President has moved a long way since he came into office, whether his party has done so or not, because the chief aim in life of the party in power for the last two years has seemed to be the prodding of big business.

Louisville Evening Post, Jan. 30—President Wilson yesterday, in a public address, said, among other interesting things, "that since practically all business concerns were no longer private but were owned by a number of people, there should be full publicity about their affairs." We do not know where this theory of universal inquisition into the affairs of other people arose, but whatever its source, it is indefensible, and utterly mischievous. The only businesses which have not this right of privacy are, first, governmental business, which nevertheless is largely conducted in secret by secret devices, full knowledge being kept from the owners of the business; second, the business of common carriers of passengers, freight and intelligence, which business is public business, conducted by corporations which are accepted as substitutes for governmental agencies and are given place on governmental highways, with other governmental powers and privileges; third, public utilities in cities, which are also arms of the government; fourth, banking, insurance and related interests, requiring some form of a government guarantee, based on governmental inspection.

Address of C. Loomis Allen at Mid-Year Dinner

Spirit of Full and Frank Publicity Becoming Universal—New Committee on Public Relations

The toastmaster at the dinner of the American Electric Railway Association and the American Electric Railway Manufacturers' Association was C. Loomis Allen, president of the parent organization. As Mr. Allen's remarks were somewhat broader than those usually given by a toastmaster it has been deemed of interest to print in this issue the more significant passages of his opening statement, as follows:

The meeting of to-day and this dinner of to-night are, I am firmly convinced, typical of the present state of mind of our association, and a bright augury of future prospects. They have their keynote in a frankness which is a reflection of Article X in the code of principles adopted by your association at Atlantic City in October, 1914.

If the association, in behalf of the industry, is to achieve the results at which it aims, the beliefs expressed in this article cannot be too often emphasized. I call it to your particular attention again to-night because I believe that of all the declarations which the code contains it is the most important, as directly reflecting the spirit in which we must proceed in order to secure that which is vitally necessary, if public utilities are to continue in their present form.

"Full and frank publicity should be the policy of all transportation companies, to the end that proper information may be available to the investor and the public." So the article reads.

It will be remembered that although submitted in advance to the member companies for their criticism and emendation, the code of principles was adopted by the convention without a dissenting voice. We can, therefore, safely assume that the full meaning of the several planks was realized by those companies who subscribed by their assent to its far-reaching declarations. Article X means, in consequence, that the electric railways of the country, as represented in this association, are prepared to submit with the greatest frankness their affairs to the scrutiny of patrons.

If in the past there was reason for the policy of secrecy which seemed to envelop corporation matters, that reason has disappeared. Our cards are thrown face upward upon the table, and in the spirit of co-operation and mutual helpfulness we appeal to the people of the communities which we serve in the firm belief that the reason and the justice of our plea will lead to that co-operation which ultimately will give a solution of the problems which have confronted this industry during the last decade.

Publicity, gentlemen, is not a new thing to the electric railway industry. For years we have had publicity thrust upon us unsought. Our sins have been magnified by the lenses of demagogy. Our good deeds have been hid in the shadows cast by the searchlight of the muckraker. No public service company ever has or ever can escape publicity. It is for this association and the industry to say, however, what shall be its character. Shall it be the publicity which comes from *ex parte* investigations inspired by the self-exploiter, seeking political advancement at the expense of our interests? By the fantasies of the half-baked theorist? By the malicious activities of those whose delight it is to attack all prosperity? Or shall it be the publicity that comes from our belief that of all tribunals, the tribunal of a public properly informed, and with a full knowledge of all facts, is in the end the fairest of all?

Business ethics, like all things else in this world, are subject to evolution. The structure of business in the United States to-day is vastly different from that which existed in the days of our fathers. Economic development has been rapid. The individualism which was responsible in the first instance for the development of our resources is, to a large extent, disappearing and a spirit of co-operation in all lines is taking its place.

The $150,000,000 invested in the traction business in 1882 has increased to $4,500,000,000. The 35,000 employees of that year have multiplied until to-day there are more than 300,000, and the 3000 miles of track have expanded until now nearly 41,000 miles of track cover city and country. Not one force at work in this country since 1888, when in the near-by city of Richmond the first complete electric city system was inaugurated, has contributed so much to the prosperity and growth of the cities of the United States as has the electric railway. It has bound together the town and country. It has done away with the necessity of congestion in our large urban communities. It is conserving health, and it has brought prosperity in its wake.

It would indeed be surprising if in the course of this development, if during these full years, when the genius of the inventor, the energy of the executive and the vision of the promotor were all feverishly at work in the creation of the magnificent system of local transportation which exists to-day throughout the country, errors had not occurred, if indeed sins of omission and commission were not an accompaniment, if perfection in method or in practice had been arrived at.

For one I am ready to admit the errors; I am even ready to admit in some degree the sins; and I make no claim for perfection. I do say, however, that the development of the electric railway industry has been accomplished with no greater degree of error, with no greater taint of sin, than the development of any of the other marvelous industries which have made the United States what it is to-day.

I maintain that the good which the industry has done so far overbalances the evils, that we, as its representatives, may appear before the people of this country with our heads erect and with no apology in our speech and ask of the public fair treatment, to the end that the development so splendidly begun shall be carried to its full conclusion, and the people of our urban and rural United States receive the best possible service at the least possible cost.

Under our theory of government it is in the end the people who must decide. In some form or other our case will go to the public for a final decision. It is for us the organized representatives of this industry, to say in what form that shall be.

On Monday night Jan. 25 your committee on public relations, consisting of representatives from members of your Manufacturers' Association and your Railway Association, held a meeting in New York, at which the machinery for reaching the people with our case was assembled. Three sub-committees were appointed to have charge of various channels by which the sources of public information can be kept in touch with our ideas and our ideals. This is but a beginning, but it is a start in the right direction.

With your assistance and with your co-operation this committee and its subdivisions can give to the electric railways that which they have for so long looked and which is so necessary for their welfare, a voice. We have been inarticulate too long. It is time that we had our day in that court of public opinion the attention of which has been far too long monopolized by our enemies. With your assistance we will have it, and I bespeak in behalf of Mr. McCarter and confrères on the committee of public relations, your whole-hearted co-operation and help.

The Brady Medal Award

Below Is Given an Abstract of Parts of the Report of the Committee on Award Outlining Safety Methods of the Companies Honored—Awards Will be Officially Made in New York on Feb. 10

In last week's issue a brief note regarding the award of the Anthony N. Brady medals was printed, with a statement of the fact that copies of the report of the award committee were distributed. Below are given some extracts from the report. Information regarding the individuals honored in the award, including details of their work in the safety movement, together with their portraits, appear elsewhere in this issue. Mr. Sears was a pioneer in safety work and originated much of the activity described below. His campaigns to reduce infant accidents and drunkenness and other nuisances on cars have been effective. His expert knowledge of workmen's compensation acts in general has enabled him to administer the Massachusetts act with extreme fairness and justice. Mr. Neal has been active on the shop committees, combining enthusiasm with ripe experience. He has compiled many instructive briefs, regarding the treatment of common ailments, which are discussed at safety meetings. At present he investigates all accidents which occur at the Albany Street shops of the Boston Elevated Railway. He was for two years chairman of the shop safety committee.

The medals will be officially awarded at the annual meeting of the American Museum of Safety, which occurs on Feb. 10 at the United Engineering Societies' Building in New York.

Some Facts Regarding the Boston Elevated Railway System

The Boston Elevated Railway controls and operates practically all of the passenger transportation lines in the city of Boston and the surrounding cities of Cambridge, Everett, Malden, Medford, Somerville and the towns of Belmont, Watertown, Brookline and Arlington, and also operates to a more limited extent in the cities of Chelsea and Newton. The municipal area of Boston contains a population of about 700,000, but its true transportation area is made up of a number of separate municipal units containing together in excess of 1,200,000 population. The business district of the city is comprised within a very narrow area, through some part of which practically all of the 1600 cars and the 150,000 daily trips made by these cars pass. The narrowest and most involved streets of the city are within the same area. The longest stretch of straight track in the congested district is 1050 feet, and this is on Washington Street, the principal and most congested street in the city, the width of this street from curb to curb in the widest part being but 31 ft.

Applicants for employment on the rapid transit lines are limited to the positions of gatemen, brakemen on these lines obtaining their positions only after having worked as gatemen, guards only after having worked as brakemen, and motormen only after they have served in all three of the lesser positions. As a result it takes about seven years of service to become a motorman on the rapid transit line. The company is also considering a plan to require physical examination of applicants for positions in the maintenance department. Prospective trainmen are instructed in a special school and later are under the direction of an instructor while in car service. In connection with the matter of examination of prospective employees the company cooperated with Prof. Hugo Münsterberg, head of the department of psychology at Harvard University, in making psychological tests upon trainmen, designed to yield data of use in accident prevention. Every year all motormen and conductors on the surface lines and all motormen, guards and brakemen on the rapid transit lines are required to pass an eyesight test.

During the past year strenuous effort has been made to increase the supervision of car men by inspectors. As the result of the practice of keeping detailed reports of all cases in which inspectors have called matters to the attention of car man or superintendent, there has been an increase of over 100 per cent in the number of reports made in a year. The records of a certain number of employees are reviewed every week, so that the record of every employee in the service is carefully scrutinized at least once in six months. In the effort to impress upon employees the effects of the infraction of rules the legal department maintains a corps of accident clerks. Their duty is to observe the conditions which are conducive to accidents and to point out the ways in which accidents can be averted. Accident charts posted in the carhouses and revised daily have been found useful. Letters regarding the safety problem have also been mailed to the men at their homes and these have been appreciated.

The company not only makes total abstinence from the use of intoxicating liquors a condition of employment, but enforces strictly its rule making intoxication in uniform a reason for discharge, and in many cases has even discharged men who have become intoxicated when not in uniform and off duty.

During the year ending June 30, 1914, the company has succeeded in reducing the number of blue-uniformed men leaving the service from 2362 to 1166 or 50.5 per cent as compared with the year ending March 31, 1912, this being the most recent one for which the figures for comparison were obtainable, and has reduced the number of blue-uniformed men entering the service from 2380 to 1145, or 52 per cent.

The company has conducted a campaign for the prevention of accidents to school children, which was begun in the fall of 1909. In October, 1913, a circular was prepared with the title, "Safety Work with School Children," which has had a very wide circulation. In June, 1914, the Boston Chamber of Commerce was induced to give its sanction and name to a general "safety first" campaign. The first step of this consisted of an active and strenuous circularizing of the schools in metropolitan Boston during the last two weeks before vacation. About 200,000 bulletins over the signature of the Boston Chamber of Commerce, calling attention of fathers and mothers to the seriousness of accidents and inviting their co-operation, were distributed. About 7000 special circulars were sent to the teachers of the schools containing outlines of talks to be given by them to the children before the summer vacation. In this movement the school officials and teachers cooperated heartily.

In the campaign the police and the fire commissioners, the Amalgamated Association of Street and Electric Railway Employees of America, the New York, New Haven & Hartford Railroad and the employees of the company, all co-operated with the Chamber of Commerce.

For the month of July, 1914, in which special account was kept, there was a total reduction of 25.3 per cent in the number of accidents reported as compared with July, 1913, and this in spite of an increase of 9.9 per

cent in the number of passengers carried and an increase of 6.8 per cent in the number of trips run.

Safety committees were instituted throughout the entire system on July 1, 1913, the total number of local committees being thirty-seven. These committees represent all grades of work in the company's service, every division of the operating bureau being represented by one or more. The work centers in a general safety committee, composed of executive officers and heads of departments, whose duty it is to take final action upon all recommendations which have not been approved by the head of the bureau. A general secretary, appointed by the general safety committee, devotes his entire time to attending meetings of local committees, making records of suggestions and following the course of suggestions until they are either adopted or rejected. During the first year 371 men served on the various safety committees and 532 suggestions were received.

SOME FACTS REGARDING THE PUBLIC SERVICE RAILWAY AND RAILROAD SYSTEMS OF NEW JERSEY

The Public Service Railway and Public Service Railroad operate over practically the entire State of New Jersey, and serve twenty-one cities and 119 towns and municipalities with a population, according to the 1910 census, of 1,898,559. The greater part of the system is purely urban, but some of the lines operate in rural districts.

Employees are trained in a school of instruction, after passing the physical examination, and are there thoroughly prepared for their future responsibilities. After a day in the school, where they are drilled on instruction cars and instructed in the rules, those who pass the required examinations are put on the road under competent men and receive training under actual road conditions. After a period of from seven to ten days they are recalled to the school and again examined before being placed in charge of their cars. For any infractions of the rules after being placed on a car employees are sent back to the school on their own time to be drilled on those rules which have been infringed. One instructor, specially qualified, drills all students in accident prevention and the method of procedure after an accident has occurred. Lectures, illustrated with lantern slides and moving pictures, are delivered to all conductors, motormen and inspectors at all of the carhouses twice during the year.

During the past year a committee on safety, consisting of the heads of the various departments, with the general claim agent as chairman, was organized. This committee meets monthly and is open to suggestions from all employees regarding conditions of roadway, equipment and operation from a safety standpoint.

For the past three and a half years a welfare plan for the payment of insurance, sick benefits and pensions to employees, their relatives and dependents, has been in operation. The employees receive these benefits without cost. The work, upon which the company expended nearly $54,000 last year, is under the direction of a welfare department.

In alleviating the effect of accidents first aid is applied to all injured persons, and during the past year the services of more than fifty physicians, regularly engaged for the work, were at the command of those needing emergency treatment. All power houses, shops, substations, line wagons, etc., are equipped with first-aid cabinets, and in each carhouse and substation hangs a chart illustrating the Schaefer or prone-pressure method of manual resuscitation, and each employee is required to familiarize himself with it. Employees are also trained by a practical man, who spends much of his time in going from place to place giving lectures and illustrating manual resuscitation.

On Jan. 1, 1914, a filing system was installed in the claim department by which every accident is indexed under six headings, as follows: Car number, conductor's number and name, motorman's number and name, car line and carhouse, nature of accident and place of accident. By means of this system the company is enabled quickly to note repetitions of any kind of accident and to notify the heads of departments immediately so that further repetition may be prevented.

As part of the educational equipment special reels of safety films have been made in co-operation with the Edison Company, and these are now being exhibited throughout the country. The campaign has also been extended to include wagon owners and drivers, who have been reached by visits, lectures and the distribution of large safety posters.

In conclusion it may be noted that, during the past eight years, the percentage of expenditure for accidents in comparison with gross earnings have been reduced from 8.64 per cent to 4.16 per cent by almost exactly equal steps.

SOME FACTS REGARDING THE NORTHERN OHIO TRACTION AND LIGHT COMPANY

The Northern Ohio Traction & Light Company operates interurban railroads from Cleveland to Uhrichsville, Ohio, and from Wadsworth to Ravenna, Ohio, in six different counties. It also operates the Akron, Canton and Massillon city lines. In addition it does a lighting business in Akron and a number of other municipalities. The railway system is the third largest in the State of Ohio.

The safety organization of the company is under the general jurisdiction of the supervisor of safety, who is also general claim agent. There are five safety committees, comprising sixty-five employees, selected from all departments of the organization. The line and shop departments have additional committees. The members of the safety committee are elected by the men of the different divisions by secret ballot. Very good men have thus been secured. There is also a general committee made up of the heads of departments. The local safety committees made weekly reports on the suggestions which have been received, and these are acted upon promptly.

Among the successful plans devised by the supervisor is the sending of an accident letter every two weeks to all employees. This contains suggestions as to how accidents can be eliminated, and calls their attention to the accidents that have occurred just previously and suggests how they could have been prevented.

The general passenger agent of the company publishes a bulletin twice a month. In this a certain amount of space is always given to safety matters. This bulletin is distributed free of charge on the cars of the company.

Quarterly Pamphlet by New York Up-State Commission

The Public Service Commission for the Second District of New York has just issued its regular quarterly pamphlet containing abstracts of the quarterly reports made to it by the operating steam and electric railroads of the State. The current pamphlets contain condensed balance sheets for each company as of Sept. 30, 1914, with corresponding figures for June 30, 1914, and condensed income statements showing revenue and expenses, fixed charges, etc., as reported for the three months ending Sept. 30, 1914. They also contain certain statistical data throwing light on operations during the quarter, such as the amount of freight and the number of passengers carried, ton-miles, passenger-miles, car-miles, etc.

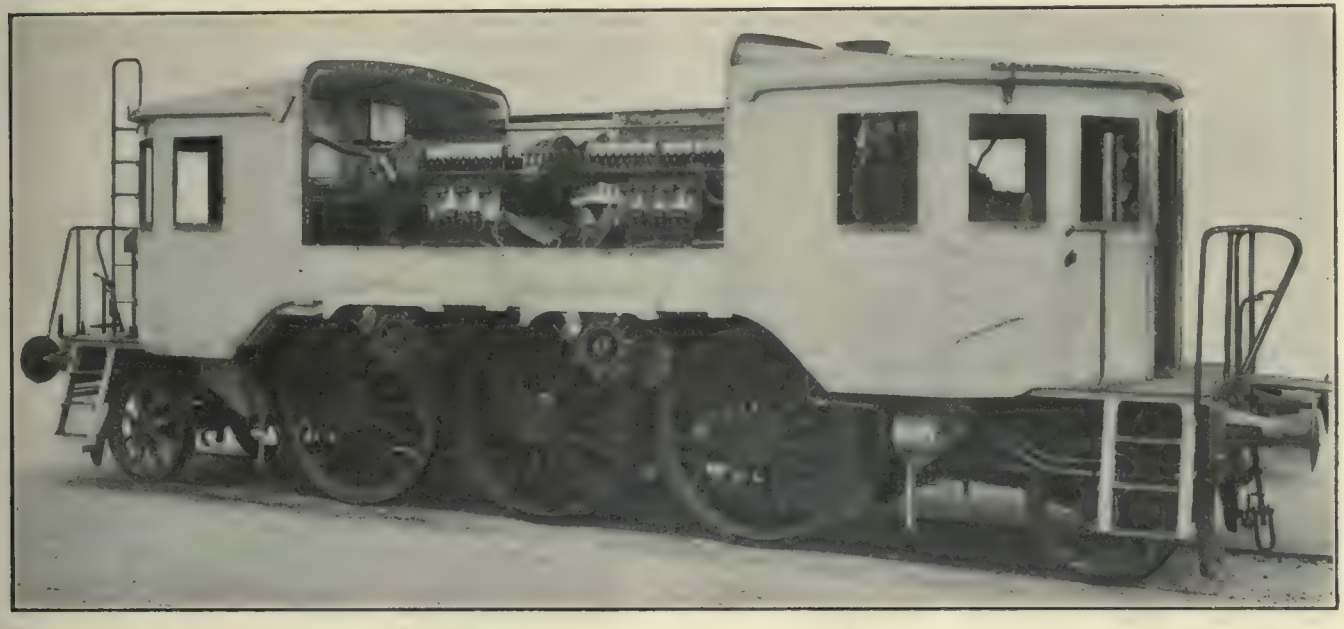
Three-Phase Italian Passenger Locomotives

These Additional Locomotives, Weighing 73 Metric Tons and Carrying Two 1300-hp Motors Each, Are for Passenger Service on the Giovi Subsidiary and Monza-Lecco Lines

BY G. PONTECORVO, EAST PITTSBURGH, PA.

The Società Italiana Westinghouse is now delivering to the Italian State Railway sixteen three-phase locomotives. These new machines have two 3300-volt, 16.7-cycle induction motors of 1300 hp each, of the slip-ring type. The stator windings are designed so that the coils can be grouped either for two-phase, six poles, or three-phase eight poles. Similarly the rotor has a special winding which can be connected for either two-phase, six poles, or three-phase, eight poles. Only seven slip rings are required. A group of three or a group of four of the seven slip rings can be connected to the stator of the second motor when a three-phase, eight-pole, or two-phase six-pole cascade is required. Otherwise they can be short-circuited through the water rheostat when a jet of water against the resistance plates to prevent concentration of heat at the surface of the water, but all the water assumes an even temperature.

The automatic regulator is designed so as to regulate for constant watts instead of constant current, as was the case in the older type of rheostat. The regulator consists of a laminated core with a two-pole winding connected in series on the ground phase of the motor and constituting the stator, and of a double T-shaped rotor with a winding inserted between the other two phases. The torque exerted between stator and rotor is counterbalanced by a spring, and the tension of this spring can be regulated by the starting controller operated by the motorman so as to predetermine the amount



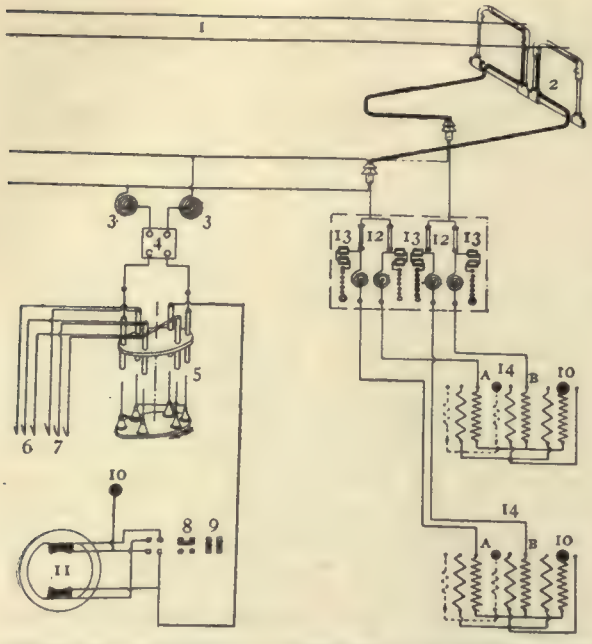
THREE-PHASE ITALIAN PASSENGER LOCOMOTIVES—FIG. 1—THE LOCOMOTIVE WITH PANTOGRAPH SECTION AND DRIVING MECHANISM REMOVED, SHOWING THE RELATIVE LOCATION OF MOTORS AND CONTROLLERS TO THE DRIVERS

the motors are connected in parallel to the line. The two motors, of course, are connected mechanically.

By connecting the motors in parallel on the line (connected either for two-phase, six poles, or three-phase, eight poles), or connecting them in cascade, a four-speed combination can be obtained which at 16.7 cycles with a wheel diameter of 1.63 m (= 64.2 in.) gives four running speeds of 23.3, 31, 46.6 and 62 m.p.h. These are fully sufficient for passenger service locomotives, not only on level lines, but also on fairly high grades.

The change of the motor connections from parallel to cascade, and also from six to eight poles, two or three-phase, is made by a drum type controller operated through electropneumatic relays by a master controller. The method of starting the wound-rotor induction motor is by means of a liquid rheostat with an automatic regulation feature which increases or decreases automatically the amount of resistance inserted in the rotor, so as to keep the power absorbed from the line fixed at a predetermined value. It is also supplied with a motor-driven centrifugal pump which is inserted in the line as soon as the rheostat is in operation. This pump throws of power to be absorbed from the line by the motors. When the power absorbed by the motor exceeds a predetermined value, the regulator tends to rotate in one direction, thereby increasing the resistance inserted in the rotor which in its turn decreases the power absorbed; vice versa, when the power absorbed tends to decrease, the regulator rotates in the other direction, thus keeping the amount of power taken by the motor at a constant value. Besides the controller and liquid rheostat, the locomotive is equipped with the usual auxiliary apparatus and instruments. There is, however, in addition, a small transformer to change the power supply from three to two-phase.

Fig. 2 shows the connection between the overhead line and the primary switch through the trolley, impedance coils, and oil switch; also the circuit supplying the auxiliary apparatus with fuses, lightning arresters, and transformers. The three phases consist of two overhead wires and the rails or ground phase. There are, as already mentioned, four connections of windings and motors to obtain the four running speeds. Two connections are shown in Fig. 3; that is, the three-



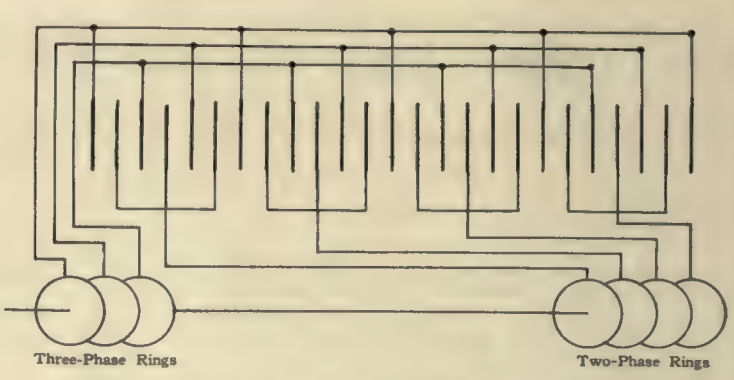
THREE-PHASE ITALIAN PASSENGER LOCOMOTIVES—FIG. 2—WIRING DIAGRAM SHOWING CONNECTIONS FROM THE TROLLEY TO THE MOTOR SWITCH AND AUXILIARY APPARATUS

1. Contact wires; 2, trolley; 3, inductance coils; 4, automatic circuit breaker; 5, primary switch; 6 and 7, to motor primaries; 8 and 9, connections of automatic regulator for cascade and parallel connection, respectively; 10, ground connections; 11, stationary part of automatic regulator; 12, fuses; 13, lightning arresters; 14, transformers with primary and secondary, *A* and *B*, respectively.

phase, eight-pole cascade and the two-phase six-pole parallel. All of these connections are made by the controllers, which are never operated under load. The connections from the slip rings to the water rheostat are shown in Fig. 4. The water level, rising in the rheostat, fills the space between the plates, thus short-circuiting the rotor windings, which are connected to the plates as shown. The controller, the trolley and the liquid rheostat, are operated by compressed air supplied by a small three-phase motor and compressor, which also supplies the air for the two air brakes (the automatic and straight air brakes).

The motors are well ventilated with air circulation through stator iron and winding. The stator end connections are dipped in an insulating compound and then covered with a brass plate to prevent damage. Experience has shown that this construction has done away with insulation break-downs due to moisture and vibration caused by heavy currents at starting.

This locomotive has five axles, and is of the 2-6-2 type, that is to say, two axles are supporting axles and the other three are driving. The two supporting axles are



THREE-PHASE ITALIAN PASSENGER LOCOMOTIVES—FIG. 4—LINE DIAGRAM OF LIQUID RHEOSTAT CONNECTIONS FROM THE MOTOR SLIP RINGS

placed one at each end of the locomotive, and each is connected to the driving axle next to it so as to form a kind of truck. All three driving axles have a transverse play for easy operation on curves. The slip rings are outside the wheelbase and easily accessible.

The weight of the locomotive, complete, is 73 metric tons, of which 45 to 51 tons is adhesive weight. The weight on the drivers can be changed within these figures by an arrangement which shifts the weight from the drivers to the supporting axles. The weight and dimensions of the locomotive are given in Table I.

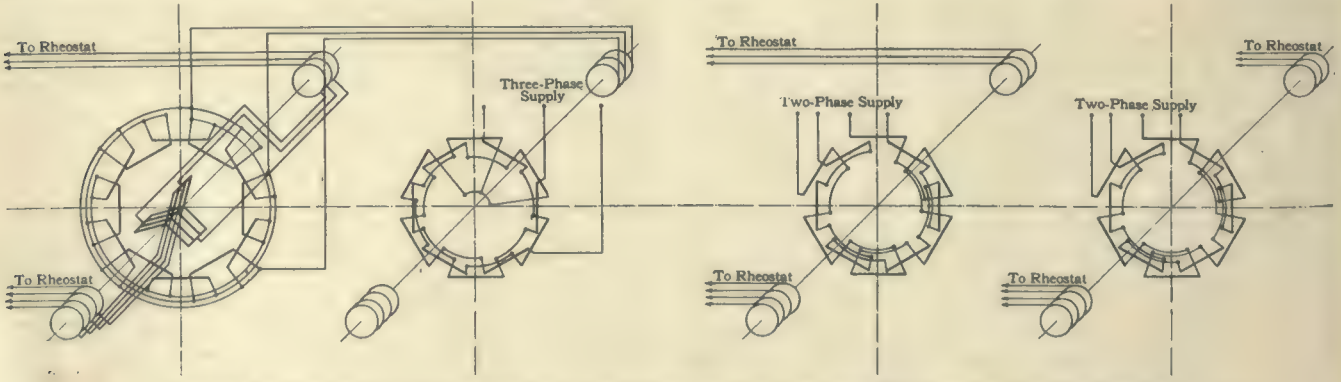
TABLE I—WEIGHTS AND DIMENSIONS

Items	Weights Kg.	Weights Lb.
Mechanical equipment	30,650	67,500
Motor equipment	27,270	60,000
Control equipment	12,700	28,000
Air-brake equipment	2,300	5,050

Items	Dimensions Meters	Dimensions In.
Maximum width	3.05	120
Maximum length	11.00	434
Diameter of driving wheels	1.63	64
Diameter of pony truck wheels	0.93	37.8

The motors are mounted on the frame in such a way that the air gap of the motor can be kept as small as electrical considerations will permit. This is done by making the bearings which support the rotor rigid with the stator frame, and independent of those which support the revolving shaft. The motors are connected to the driving wheels by a Scotch yoke similar to that of the Giovi locomotive.

These locomotives are designed for the Giovi subsidiary line and for the Monza-Lecco line, which connects Milan to the Lake of Como and the Valtellina lines which were electrified in 1901 with the same system. The Monza line is level single-track, while the Giovi subsidiary is double-track and has fairly high grades, reaching 1.6 per cent in the open and 1.16 in a 5.2-mile tunnel.



THREE-PHASE ITALIAN PASSENGER LOCOMOTIVES—FIG. 3—TYPICAL MOTOR CONNECTIONS

Showing the method of connecting the two motors for three-phase, eight-pole, cascade (left) and for two-phase, six-pole parallel.

Operating Results

Some figures regarding the performance and tests of this type of locomotive may be interesting. The normal rating of the two motors is 2600 hp at three-phase, 16 2/3 cycles, 3300 volts and is such that the locomotive can develop for one hour continuously the drawbar pulls given in Table II with a motor temperature rise not exceeding 75 deg. Cent.

Table II—Relations Between Drawbar Pull and Speed

Drawbar Pull		Speed	
Kg.	Lb.	Km.p.h.	M.p.h.
9,000	19,800	37.5	23.3
9,000	19,800	50	31
9,500	20,900	75	46.6
6,000	13,200	100	62

This locomotive can start a train of 350 tons (exclusive of locomotive) and bring it up to 75 kw p.h. (= 46.6 m.p.h.) speed on a straight line having a grade of 1.2 per cent with an acceleration of 0.15 km (= 0.093 mile) per hour per second; the tractive effort at starting is such as to utilize fully the adhesion between zero and 75 km (= 46.6 miles) per hour speed.

Of these locomotives the Italiana Westinghouse Company has already built sixteen and their operation is very satisfactory. They are run regenerating on the down grades, in this way greatly reducing the operating expenses. Their cost compares favorably with the cost of electric locomotives in the United States; however, the ratio of horse-power to weight, or 2600:73, is considerably higher.

These locomotives are rapidly solving the problems of high speed freight and passenger service on the lines on which they have been installed. Some doubts were expressed some time ago as regards the overhead line having two wires. However, no trouble has been experienced, although the overhead construction, with sliding pantograph construction, would be considered rather light in this country for such service.

Change in Car-Wiring Code Recommended

At the tenth annual convention of the Western Association of Electrical Inspectors held at the Hotel Radisson, Minneapolis, Minn., on Jan. 26-28, the report of the committee on electric traction systems recommended a change in the car wiring and equipment code as now used by the National Board of Fire Underwriters. These recommendations were approved by the association and will be submitted to the electrical committee of the National Fire Protection Association at its next meeting. The existing code appears in the 1913 edition of the National Electrical Code, which contains the rules of the National Board of Fire Underwriters.

Some of the more important amendments to the code include recommendations for self-closing doors in cabinets and for watertight conduit joints with drain holes provided at points where moisture is liable to collect. Also the combustible underside of car bodies should be protected with a fire-resisting material over all electrical apparatus. Rheostats which are at all times energized by trolley current should be surrounded by a grounded No. 8 wire netting guard having a 1-in. mesh. Wires for circuits controlling contactors, unit switches and cut-outs should not be run in the same cable, channel or conduit with power wires. Transformers or compensators should have their cases or shells thoroughly grounded. Arresters, choke coils and their connections should be installed ahead of all other electrical devices and metal conduit.

Included under the topic of electrical heaters were a number of revisions requiring that heaters should have metal inclosures which were thoroughly grounded and which should prevent inflammable material from collecting around or inside of heater casings. Panel heaters should be so mounted that there will be 4 in. between the heating element and any combustible material. Heaters should be so mounted that the heat cannot vent into the area back of the heater. Cross-seat heaters either should be mounted at least 4 in. below the under side of seats, or else the under side of the seat should be protected by not less than ¼ in. of fire-resisting insulating material. All conductors should have a rubber insulation surrounded by an outer flame-proof covering, and all circuits should be in approved metal conduit or molding installed according to rules. Switches meeting with the underwriters' requirements are to be provided and inclosed in a metal cabinet.

In order to put before the association some suggestions regarding changes in the carhouse wiring rules and instructions as included in the underwriters' code, J. S. Mahan, Chicago, chairman of the committee that is investigating this subject, reported a tentative set of revised rules. No action was taken on these suggestions, the committee being at liberty to proceed with the work of revising the rules. It is the plan of this committee to submit copies of the proposed rules to various master mechanics and superintendents of motive power of electric railways throughout the country for their criticisms and suggestions before submitting them to the association in final form. Copies of the proposed carhouse rules may be obtained by addressing F. R. Daniel, chairman of the electric traction system committee, Insurance Exchange Building, Chicago. Like the revised car-wiring rules it is intended to bring the carhouse-wiring rules, as well as the arrangement, up to date, so that they will be more readily available to those interested in using them.

Burton McCollum of the United States bureau of standards presented an exhaustive discussion on the subject of electrolysis. He recommended primarily a proper definition of the responsibilities of both railways and the pipe-owning companies in the prevention of electrolytic damage, but advocated co-operation in all cases. Where rules governing electrolysis mitigation are necessary, they should preferably be erected and administered by state authority, under which the necessary administrative machinery is available. In their absence, however, the cities in which the utilities operate should take the initiative. The federal government, while competent to carry out, as it is now doing, engineering investigations bearing on the problem, should not, and in fact cannot, undertake to prescribe or administer regulations. Where state public utilities commissions are in existence, they are the most logical authority. Such state commissions not only are able to deal with the subject in a more comprehensive way than the majority of local bodies, especially in smaller cities, but their freedom from local political influence will often enable them to deal more wisely with all interests involved.

It is most desirable that regulations be made as few and as simple as possible, to the end that the utilities concerned may enjoy the greatest freedom of action consistent with safety to the underground structures. The present apparent necessity for regulation is due to the lack of co-operation in the past between the railways and the owners of underground utilities. If the interests concerned, particularly the railways, would show a greater disposition to meet the issue squarely, and if, instead of practically ignoring the subject as has been too often done they would treat the matter as one of the engineering problems connected with the operation of street railways, the need for stringent regulation would be largely eliminated. In the absence of such a policy, however, compulsory and perhaps burdensome regulations will be inevitable.

Saving Energy in Car Propulsion

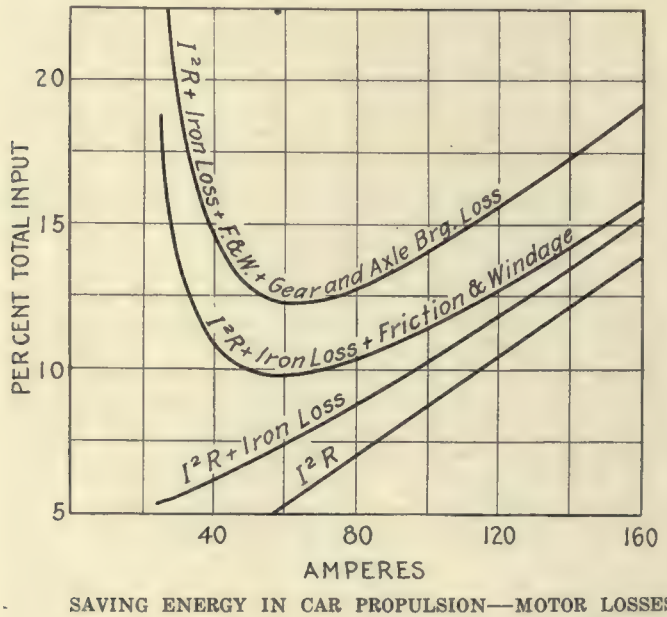
W. N. Storer Analyzed the Possibilities of Energy Saving by Improved Methods of Car Design and Operation at a Joint Engineering Meeting in Chicago on Jan. 25.

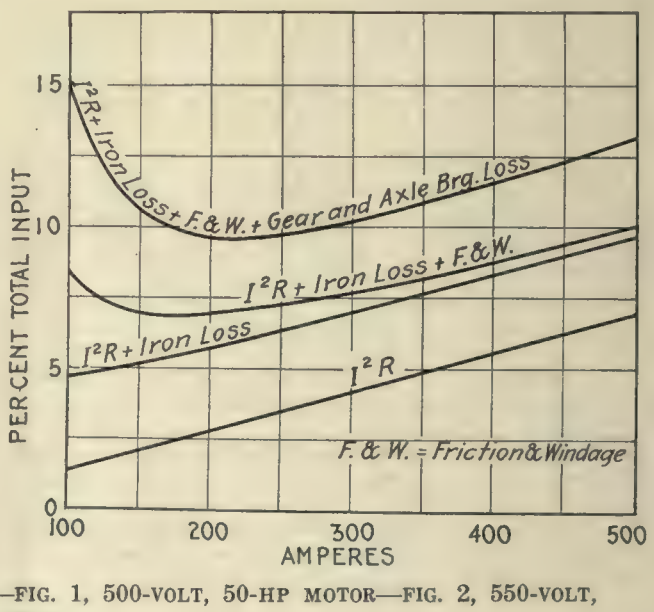
On Jan. 25, at a joint meeting of the electrical section of the Western Society of Engineers and the Chicago branch of the A. I. E. E., W. N. Storer, general engineer railway department Westinghouse Electric & Manufacturing Company, delivered a paper under the title "Economy of Power Consumption on Electric Railways." The purpose of the paper was to show how economy in energy consumption can be secured and the limitations imposed in the application of the different methods. He called attention to Samuel Insull's, April, 1912, A. I. E. E. paper, in which the statement was made that not far from 1,000,000 tons of coal would be burned in Chicago in that year to furnish power for electric railways. In Mr. Insull's opinion not less than 40 per cent and possibly 50 per cent of the coal consumption could have been saved by the use of all possible economies. Mr. Storer discussed the subject of loss reduction under these heads.

Train Resistance

The train resistance of a street car varies between 10 lb. and 20 lb. per ton, corresponding to about 25 to 50 watt-hours per ton-mile. As the total power consumption usually varies from 120 to 180 watt-hours per ton-mile, probably not more than 25 per cent of the total energy is used in overcoming resistance. The proportion is larger in elevated and subway service, where runs are longer and many curves are encountered, especially where the speed becomes so high as to give a high air resistance.

Train resistance can be reduced in the following ways: Journal friction, which is probably not more than





SAVING ENERGY IN CAR PROPULSION—MOTOR LOSSES—FIG. 1, 500-VOLT, 50-HP MOTOR—FIG. 2, 550-VOLT, 210-HP MOTOR

Storer stated that, since that time, cars have been installed on the Chicago Surface Lines which have cut the power consumption per car-mile to less than 67 per cent of that of older cars of the same capacity.

A large part of the energy now consumed is unnecessarily wasted, but on account of the large investment in existing equipment the waste must continue until the older cars and equipment are worn out. Even in the most modern equipment considerable power is wasted. The waste can be reduced by reduction of weight to be handled and by increase in the efficiency of the equipment used in handling it.

Reduction in weight has been secured by the use of two-motor equipment with maximum traction trucks instead of four-motor equipment, by the reduction in motor capacity made possible by the weight reduction, and by the use of motors weighing less per horse-power. Along with these reductions has gone the lightening of car bodies and trucks.

The energy consumed by electric cars is practically all dissipated in overcoming train resistance, in ascending grades, in motor losses, in gears and motor axle bearings, in rheostats, in auxiliaries and in brakes. Mr. Storer discussed the subject of loss reduction under these heads.

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Train resistance can be reduced in the following ways: Journal friction, which is probably not more than 6 lb. per ton in average service, can be practically eliminated by the use of ball or roller bearings, resulting in an energy saving of from 6 to 15 watt-hours per ton-mile and possibly more. In high-speed railroading air resistance, which at a speed of 60 m.p.h. may amount to 800 lb. or 1000 lb. and may require from 110 kw to 150 kw to overcome it, can be reduced by eliminating projections which cause eddies in the atmosphere. Flange friction can be reduced by eliminating bad curves, by effective tramming of trucks, by removing inequalities in wheel diameter and other causes tending to make the wheels hug one rail.

Grade Resistance and Motor Losses

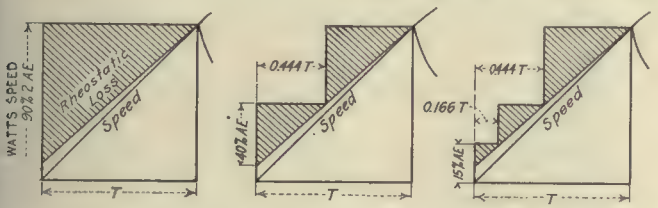
Power required in ascending grades can be decreased only by reducing weight, although it is sometimes possible to use the energy stored in a train in descending one grade to help it up the next. This is seldom done in street car work, but is quite common on lines where long runs are made. Short grades of 1 per cent or 2 per cent on interurban or elevated lines add very little to the power consumption.

The efficiency of a railway motor varies from 80 per

cent to 90 per cent, small motors ordinarily used in city service having a maximum efficiency, including gears and axle bearings, of 85 per cent to 86 per cent, while large motors run 2 per cent or 3 per cent higher. The nature of the losses in typical commutating-pole motors is illustrated in Figs. 1 and 2. An increase in efficiency is sure to be accomplished by the production of a heavier and more expensive motor, as, other things being equal, the capacity of a given size of motor is practically dependent on its efficiency. It is, therefore, fairly certain that the efficiency of railroad motors is as high as the state of the art will permit with present commercial conditions.

Mr. Storer took for illustration the losses due to friction and windage, which he translated into terms of train resistance. He stated that a motor of from 40-hp to 50-hp capacity should have approximately 400 watts friction loss with a car speed of 10 m.p.h., corresponding to about a 20-lb. train resistance. With a two-motor car, weighing 20 tons, armature friction and windage amounts to 2 lb. per ton. The axle-bearing losses would probably be about one-half as much. There are few data available from which gear and axle-bearing losses can be determined, but it is hoped that in the near future further tests will be made which will enable the standardization committee of the A. I. E. E. to give more definite figures for the efficiency of axle bearings and gears.

It is possible to use some form of frictionless bearing for armatures, but such bearings as yet have not



SAVING ENERGY IN CAR PROPULSION—RHEOSTATIC LOSSES DURING ACCELERATION

Fig. 3, parallel control; Fig. 4, series-parallel control; Fig. 5, series, series-parallel, parallel control. Shaded areas show rheostatic losses.

had sufficient tests under heavy service conditions to justify their adoption, especially as the cost is considerably higher than the ordinary sleeve bearing.

Rheostatic Losses

In the matter of rheostatic losses, it is impossible to avoid such losses altogether, but they can be reduced to a much lower amount than has ordinarily been the practice. Figs. 3, 4 and 5 show the relative rheostatic losses in straight parallel control, standard series-parallel control, and control using full series, series-parallel and full parallel, respectively. In these diagrams the shaded areas represent rheostatic losses. If two motors are assumed to accelerate with a current to give 10 per cent voltage drop in the internal resistance of each motor, then, as shown in Fig. 3, 90 per cent of the voltage will be lost in the rheostat at the instant of starting and an average of 45 per cent during the time the rheostat is in circuit. During the entire time of acceleration, double motor current will be taken from the line. As shown in Fig. 4, with series-parallel control, the rheostatic power loss at starting will be 80 per cent of the line voltage with single motor current, or an average of 40 per cent of the line voltage multiplied by single motor current during the time the car is accelerating in series. The total time will be divided between series and parallel in the ratios of the counter emfs after the resistance is cut out. In this case it will be in the ratio of 40 to 90, or 44.4 per cent of the time will be spent in series and 55.6 per cent in parallel up to the time the motor curve is reached. When the motors are connected in parallel the voltage applied to the motor terminals is only 50 per cent of the line voltage, consequently the remainder of the line voltage, or 50 per cent, is lost in the rheostat. The average drop in the rheostat will be 24 per cent for 55.6 per cent of the time. If A is the current for one motor, T the time to reach the motor curve and E the line voltage, then, in rheostatic control, the loss is

$$W = 2\,A \times 0.45\,E \times T = 0.9\,A\,E\,T$$

The total energy taken from the line during this acceleration is $2\,A\,E\,T$, and 45 per cent is lost in the rheostat.

In series-parallel control the rheostatic loss is

$$W = A \times 0.4\,E \times 0.444\,T + 2\,A \times 0.25\,E \times 0.556\,T = 0.456\,A\,E\,T$$

The total energy from the line in this case is

$$W = A\,E \times 0.444\,T + 2\,A\,E \times 0.556\,T = 1.556\,A\,E\,T$$

The rheostatic loss is thus cut almost in half by using series-parallel control instead of parallel control, and the total energy during acceleration on resistance is reduced more than 22 per cent.

The use of four-motor equipment makes it possible to go still further, as is illustrated in Fig. 5. The rheostatic loss in this case is the same as in the case shown in Fig. 4, except for the area of the rectangle cut out by full series operation, the area of which is $0.083\,A\,E\,T$. The total rheostatic loss is thus

$$W = (0.456 - 0.083)\,A\,E\,T = 0.373\,A\,E\,T,$$

a decrease of 18.3 per cent below that of series-parallel control. The energy taken from the line during the time on rheostat is $(1.556 - 0.083)\,A\,E = 1.473\,A\,E\,T$, a reduction of 53 per cent. Since the rheostatic loss in ordinary city service is only 12 per cent to 20 per cent of the total energy used, the saving resulting from starting with four motors in series can scarcely exceed 1 per cent of the total, unless there is a great deal of operation at extremely low speeds.

A recently exploited system combines the operation of four motors connected successively in series, series parallel, and parallel, with intermediate steps using three motors and a limited amount of rheostatic operation. A portion of the rheostatic losses is eliminated through unequal loading of the motors, due to doubling the voltage on one motor at a time, thus heavily overloading it without a serious surge in the acceleration. A saving of from 8 per cent to 10 per cent in power is effected.

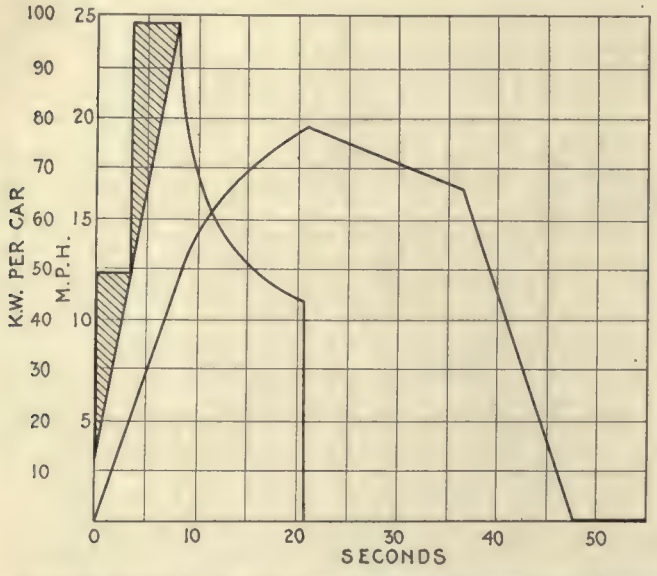
Other things being equal, the rheostatic loss varies as the square of the speed at which the motor curve is reached in acceleration. The characteristics of the motor and the rate of acceleration have, therefore, a great deal to do with the rheostatic loss. For example, a motor with a steep speed characteristic, geared for a certain schedule speed, will reach the motor curve at a lower speed than one with a flat speed curve which is geared to the same speed, and will thus have less rheostatic loss. A higher rate of acceleration will enable the motor curve to be reached at a lower speed, especially with a non-saturated motor. The rheostatic losses are thus reduced in the same way.

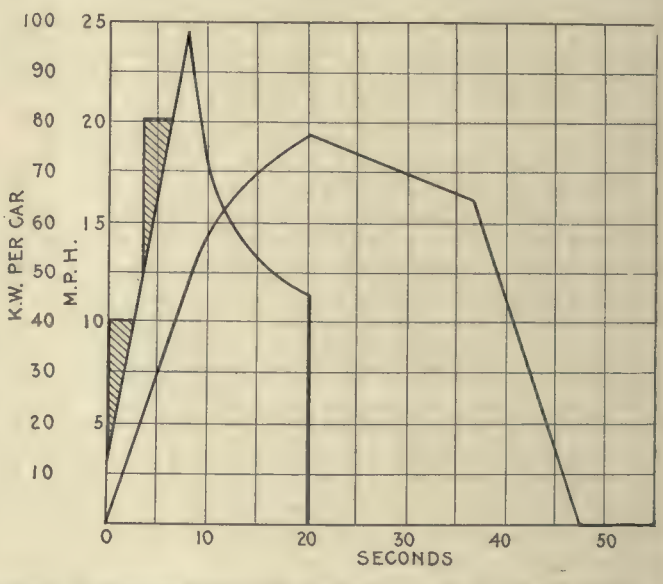
The shape of the speed curve has been too often left out of consideration because the unsaturated motor, the one with the steep speed curve, is usually slightly heavier than the saturated motor of the same rating and armature speed.

Field Control

After the series-parallel control and the single reduction motor were introduced, the control of the field as a

means of affecting economical speed variation and reduction of rheostatic losses was dropped because of the trouble from poor commutation and overloading of motors. The use of the commutating-pole motor and a better understanding of the application of railway motors to given service have led to a revival of field





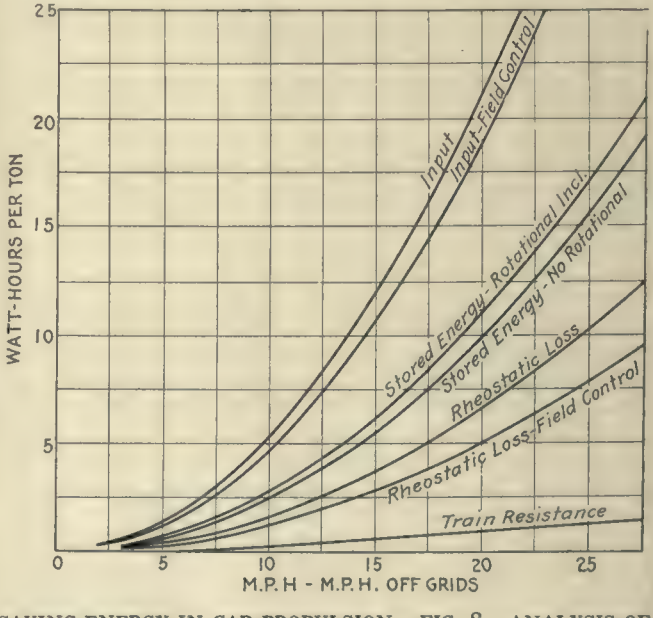
SAVING ENERGY IN CAR PROPULSION—RHEOSTATIC LOSSES—FIG. 6, SERIES-PARALLEL CONTROL; FIG. 7, SAME WITH FIELD CONTROL. SHADED AREAS SHOW RHEOSTATIC LOSSES

Data: Weight of loaded car, 20 tons; two 50-hp, 500-volt motors: 33-in. wheels, gear ratio, 16:68 (Fig. 6), 15.69 (Fig. 7); rate of acceleration and braking, 1½ m.p.h.p.s.; stops per mile, 6; duration of stop, 7 sec.; schedule speed, 11 m.p.h.; watt-hours per ton-mile, (Fig. 6) 112.8, (Fig. 7) 103.8.

control which is now used in all classes of service, usually effecting a saving of from 10 per cent to 20 per cent in power consumption. To get the best results the motor should be geared to give the highest speed desired with a short or permanent field. The full-field speed curve should be 20 per cent to 25 per cent or more if possible, lower than this short field speed curve at the accelerating tractive effort. Referring to Fig. 4 and assuming that the full speed of the motor at the accelerating tractive effort is 20 per cent below that of the short field and, as the same rate of acceleration is maintained, a field control equipment would perform the same service with approximately one-half the rheostatic loss. Where the balancing speed on short field is higher than that of the non-field controlling equipment, a still further saving in power consumption results on account of the more rapid acceleration on the motor curve, permitting a longer coasting period and consequently a lower speed at the time the brakes are applied and less loss in that period. Where stops are frequent the use of field control effects a very substantial saving. Typical speed-time graphs are shown side by side in Figs. 6 and 7, Fig. 6 showing a typical run with standard motors without field control and Fig. 7 the same run under identical conditions of load and speed, but with field control. The difference in rheostatic losses is shown by the shaded areas.

Fig. 8 shows a set of general curves which may be applied to almost any condition of acceleration. They are intended primarily to exhibit the rheostatic losses entailed in accelerating 1 ton under certain conditions of motor efficiency, train resistance and rate of acceleration, with and without field control. With these curves are included others showing watt-hour input, rheostatic losses with and without field control, and energy losses in overcoming train resistance, all plotted in terms of speed at which the motor curve is reached.

To show how these curves may be used, take the speed-time curve shown in Fig. 6. The energy stored in the train at the time the brakes were applied is all lost either in the brakes or in overcoming train resistance during braking. In this case the brakes were applied at 16.3 m.p.h., and reference to the stored energy curves shows that at this speed 7½ watt-hours per ton are stored. Part of this (4 watt-hours) is stored while accelerating on resistance at an efficiency of approximately 56 per cent; the remainder (3½ watt-hours) with motors accelerating on the motor curve at an efficiency of about 83 per cent. The first portion,



SAVING ENERGY IN CAR PROPULSION—FIG. 8—ANALYSIS OF POWER CONSUMPTION IN STRAIGHT-LINE ACCELERATION

Data: Weight, 1 ton; acceleration, 1.7 m.p.h.p.s.; acceleration force, 185 lb.; control, series-parallel, with and without field control; motor efficiency at full voltage, 85 per cent.

4 watt-hours at 56 per cent efficiency, takes 7.15 watt-hours from the line; the section portion, 3½ watt-hours at 83 per cent efficiency, takes 4.22 watt-hours from the line, a total of 11.37 watt-hours for each stop or 68.22 watt-hours per ton-mile. A train resistance of 20 lb. per ton would normally require, with an average effi-

ciency of 80 per cent, 50 watt-hours per ton-mile, but since the braking period has already been included, a deficit of 13.5 per cent must be deducted, leaving 43¼ watt-hours. The total per ton-mile is then 111.47 watt-hours. This compares with 112.8 watt-hours, as given in the figures.

The ratio of the sum of the curves of stored energy and friction to the curve of input is the efficiency of the equipment during acceleration to the motor curve. With the conditions of motor efficiency, train resistance, etc., assumed, this efficiency is found to be approximately 56 per cent. It will hold approximately constant regardless of the time of acceleration or whether on level or grade. The rheostatic loss with a given tractive effort is inversely proportional to the rate of acceleration; in other words, if the car were starting on a grade that would cut the rate of acceleration in half, the time on the rheostat would be doubled and the rheostatic loss double that shown on the curve. This curve is a good check on the speed-time curve.

OTHER POSSIBLE MEANS FOR SAVING ENERGY

Among the other means for saving rheostatic losses there is notably one in which the voltage on the motors is varied by means of a motor-generator set. Such a system is in operation in Paris and is reported to be giving very economical results. It is understood that this equipment is also operated to vary the voltage applied to the motor during the braking period so as to regenerate the stored energy of the train and return it to the line. Such a system must require a relatively large capacity of motor-generator set on the car and the cost of this set and the extra cost of motors and control would be considerable, while the additional weight to be carried around and the losses in the motor-generator set would go a long way toward absorbing any savings that might be made.

In conclusion, Mr. Storer discussed the possibilities of regenerative systems of control and prophesied that some plan will be developed to prevent the present enormous destruction of energy, which costs a great deal simply to destroy. He considered the proposition of elevating station tracks above those between stations for the purpose of changing the kinetic energy of the moving train into the potential energy of the train on an elevation. Theoretically, this is the most efficient method, but as a matter of fact the elevation which it would be necessary to climb is so great that its use would greatly increase the cost of any construction, the elevated railway stations would be so high as to require elevators to take passengers to and from the streets, and it could be used only with very short trains. Induction motors lend themselves to regenerative control readily and in many of the cases where it has been applied the saving in wear and tear on the brakes and the reduction in danger of accidents are more important than the savings.

With direct current motors regeneration has been accomplished by the use of shunt motors, but these have been used only to a very limited extent.* In Mr. Storer's opinion the essential of an equipment for regenerative braking with d.c. motors is the use of the standard series-wound motor with a control equipment that will add but little weight and complication to that used without regeneration, since every bit of additional weight and complication would mean additional first cost, additional cost of maintenance, and additional power to carry it around. The point would soon be reached where the extra cost balances the saving.

Mr. Storer called attention to the fact that he had said nothing directly concerning the importance of correct gear ratio, or the correct operation of equipment so as to take advantage of the benefits of rapid acceleration, long coasting, quick braking and short stops. He did not touch upon the saving resulting from the use of high efficiency lamps and the best distribution of light, nor of the use of the latest methods of car heating. He did not discuss line loss and its relation to the reduction in peak load by means of field control and proper gear ratio. He stated that these points have all been fully discussed. The reduction of dead weight per passenger, the adoption of frictionless bearings and the widest use of field control with motors of steep speed characteristics, and efficient handling of cars will alone be sufficient to save more than 40 per cent of the power now used on a great many roads. Any saving that can be accomplished by the development of a successful scheme for regenerating the power now lost in brakes would be so much clear gain.

DISCUSSION

Mr. Storer's paper was discussed by H. H. Adams, Chicago Surface Lines, who stated that 33 1/3 per cent reduction in current consumption had been obtained on this road, on the cars equipped with field control motors. This reduction in energy consumption had made possible a reduction from 4 kw-hr. to 2½ kw-hr. per ton-mile. H. A. Johnson, of the Chicago Elevated Railways, suggested that many interurban railways could profitably undertake a careful study of their equipment with a view to eliminating useless weight. He believed that a large percentage of light-weight cars could be used in interurban service without entailing operating difficulties or reducing the comfort to passengers. Wray Thorn, equipment engineer of the Board of Supervising Engineers, Chicago Traction, called attention to the fact that the savings made possible by improved motor designs would represent a 25 per cent increase in the net earnings per car per year when the gross was assumed as 30 cents. In obtaining this result Mr. Thorn assumed that the total expense of operation per car-mile was 26 cents, of which 3½ cents per car-mile was chargeable for power. Power cost represents about 13.5 per cent of the total cost of operation, and the purchase of new equipment had permitted a 4 per cent reduction of this item. E. J. Blair, of the Chicago Elevated Railways, and W. B. Jackson also took part in the discussion.

I. C. C. Report on Steam Railroads in 1913

The division of statistics of the Interstate Commerce Commission has issued the preliminary abstract of its twenty-sixth annual report, covering steam railroads for the fiscal year ended June 30, 1913. During this year the mileage of single track operated increased 1.67 per cent, whereas the total mileage of all tracks operated increased 2.39 per cent. The total of railroad capital on June 30, 1913, was $19,796,125,712, the increase over last year being divided $131,723,168 for funded debt and $116,763,035 for stock. The average receipts per passenger per mile were 2.008 cents, the corresponding figures for the previous year being 1.985 cents, an increase of 0.023 cent. The average receipts per ton per mile for the year were 0.729 cent, which was smaller than the corresponding average for 1912 and 1911. The rail operating revenues increased $298,177,432 during the year and the operating expenses $210,874,-266, giving an increase in net operating revenue of $87,303,166. The total revenue, including that from outside operations, increased $88,290,224. Taxes during the year increased nearly 8 per cent. Dividends declared from surplus were $85,706,629, as compared to $100,435,589 for the preceding year.

*[NOTE—An account of a recent installation of this type, that of the Wendelstein Railway in Bavaria, is given on page 274 of this issue.—EDS.]

COMMUNICATIONS

The President's Address

INTERBOROUGH RAPID TRANSIT COMPANY
NEW YORK, Feb. 5, 1915.

To the Editors:

While I was not able to reach the Washington meeting of the Railway Association in time to hear President Wilson's address, as a railway operator I appreciate the importance and significance of the occasion. The association is to be congratulated upon the fact that the President took this opportunity to express through the association to the country his ideas on some fundamental business questions.

I agree with the President that nothing is so helpful to a better understanding among people as to meet and discuss their problems together. He set an example of this last week at the meeting of our association, an example which was followed by other prominent representatives of the federal government at the meeting and the banquet. This plan could well be followed not only at formal gatherings of railway men but whenever, during the year, differences of opinion arise or seem to arise in regard to the conduct of electric railway matters. Indeed, this is an advantage of commission regulation, that the public utility interests and the public, as represented by the authorities, can meet face to face to consider their mutual problems, and in this way each side can learn the attitude and opinions of the other.

THEODORE P. SHONTS, President.

BROOKLYN RAPID TRANSIT COMPANY
BROOKLYN, N. Y., Feb. 2, 1915.

To the Editors:

In response to your inquiry regarding my impression of President Wilson's Washington speech I would say that it was full of good ideas and was hopeful in tone. I should have liked it better if it had amplified the necessity on the part of the government, in its dealings with corporations and in its own administration accounting, of recognizing and following the same high standard of honesty and fair dealing which it seeks to establish in private and corporate business.

T. S. WILLIAMS, President.

ELEVATED RAILROADS OF CHICAGO
CHICAGO, ILL., Feb. 4, 1915.

To the Editors:

From President Wilson's address, the impression was gained that he is of the opinion that the large business interests of the country could now look forward with confidence to a period of prosperity, and that business properly and lawfully conducted need not fear attacks indiscriminately by various governmental bodies, as has been the practice for several years past. The President evidently realizes that the business of the country is in need of encouragement, and it is welcome to hear this note sounded by the Chief Executive of the nation.

If a spirit of friendly co-operation with the business interests of the country permeated the national, state and municipal governments, there would be no lack of capital and few unemployed men in the United States. However, for business men to believe that governmental bodies will cease to harass business is expecting too much at the present time. The era of restored confidence which President Wilson believes is now upon us, will not come until the people fully realize what serious injury is being done, and has been done, to their interests for years, by self-seeking politicians and irresponsible reformers. Indications, however, point to a change not far distant, when the public will comprehend the true relation between their own welfare and properly conducted business, and the arguments and wiles of the politician and reformer will not meet with the easy conquests they have in the past.

When the people elect to public office men who will aid legitimate business, whether big or little, in every possible way, and work for the commercial supremacy of the United States, then and then only, will prosperity be assured. In England and Germany business is not only fostered but is also successfully governed, and the business man is honored and his counsel sought. In our country it has been quite the reverse.

The American Electric Railway Association is working along the right line in its endeavors to bring about a better understanding on the part of the public. The publicity program and high ideals set forth by Mr. Kingsbury in his able paper, will bring results not only desirable in the railway industry but equally applicable to the various business interests of the country.

BRITTON I. BUDD, President.

GENERAL ELECTRIC COMPANY
NEW YORK, Feb. 5, 1915.

To the Editors:

I want to express my thorough appreciation of the address delivered by President Wilson before the American Electric Railway Association on Jan. 29, and especially of the latter portion thereof in which he invites those connected with the electric railway industry, and others, to present their ideas on important public questions.

Seemingly our association could make no more fitting response to this invitation than to transmit to the President our recently adopted Code of Principles, which can hardly fail to receive his full endorsement.

WILLIAM J. CLARK.

MCGUIRE-CUMMINGS MANUFACTURING COMPANY
CHICAGO, ILL., Feb. 2, 1915.

To the Editors:

The impressive statements made in President Wilson's talk last Friday before the American Electric Railway Association, lead us all to hope for better business. His administration came into existence pledged to accomplish the correction of abuses in business life and to a constructive work which would build to a greater and sounder prosperity.

Some of the abuses he was pledged to correct have been corrected. I believe he has a comprehensive appreciation of commercial conditions as they exist to-day, and is going to do all he can, in a constructive way, to bring to us all, large and small, a revised code of business principles, and to do his best, notwithstanding adverse world conditions to bring us material prosperity.

JOHN J. CUMMINGS.

Terminology for Steel Construction

THE AMERICAN RAILWAYS COMPANY
PHILADELPHIA, PA., Feb. 1, 1915.

To the Editors:

In the article on the Cleveland Railway's new repair shops in your issue of Jan. 23, we notice that these buildings are described as being entirely fireproof. We notice, however, that in the interior view, the steelwork is shown as being entirely exposed. This condition would not, therefore, be considered by us as entirely fireproof but as non-inflammable. It has been our practice and it appears to be the practice of the Cleveland Railway to use the money that would be needed to protect the steel work completely for the installation of a sprinkling system. This would give protection not only to the building but to its contents.

While we are on the question of descriptive termi-

nology we might call your attention to a recent statement in your JOURNAL that cars which have steel underframes, steel sides and steel posts should be considered to be "all-steel." This may be slightly misleading, as we are building cars of this general description having outside steel sheathing up to the window sill and steel posts, and carlines are one continuous piece but having the trim, floors, roof, sash and doors of wood. We have been considering these cars as semi-steel and think this is the general practice.

C. G. KEEN, Engineer Way and Structures.

[NOTE—Our correspondent's first point is undoubtedly well taken. It is well known that exposed steelwork, in general, has less ability to resist the damaging effect of fire than wooden beams so that the buildings in question should have been classed as non-inflammable rather than fireproof.

The definition for all-steel cars to which our correspondent refers was developed arbitrarily to avoid confusion in our statistics as published Jan. 2. Under it, cars with the continuous post-and-carline construction would be classed as all-steel only if they had steel letterboards. Also, cars with all-steel framing and agasote roof sheathing would be classed as all-steel, the point being that the material used for roof sheathing is largely incidental. Of course, since this definition (like every other definition that could be used) is arbitrary, it is subject to difference of opinion, and we would be glad to receive other communications which might aid in the establishment of a definite and universally used terminology for the different types of car construction.—EDS.]

Stress Analysis of the Chicago Steel Car

CORNELL UNIVERSITY
ITHACA, N. Y., Jan. 4, 1915.

To the Editors:

We have been very much interested in the article entitled "Analysis of Stresses in the Chicago Elevated Steel Car" published in your issue of Dec. 12, 1914, page 1299. It occurred to us that it would be interesting to see how the "principle of least work" applied to an analysis of the stresses in this car would result. In consequence, we have worked out the problem as shown below and have obtained results which differ somewhat from those obtained by Mr. Johnson. The construction, as outlined by him, is undoubtedly entirely safe, but the application of the principle of least work seems to us to give a somewhat more exact, or at any rate, more logical method of analysis than the method employed by him.

As the truss form described is an indeterminate one, it could not, of course, be solved by the ordinary methods. The method employed by us also takes care of the forces in the truss due to the loads outside the bolsters which were probably also considered by Mr. Johnson, although the published solution does not indicate the way in which this was done.

The following is our solution of the problem: The lower part of the car frame, consisting of the channel, belt rail and sheeting, forms a plate girder of which the sheeting is the web and the window posts are stiffeners. This girder is 36.5 in. high. Let F equal the total sectional area of plate girder, or 7.30 sq. in.; y equal the coordinate of the center of gravity from top, or 19.75 in.; and I equal the moment of inertia of section with respect to its gravity axis, or 1352 in.⁴

Consider the left half of the truss. This includes the central door post, corner post and four window posts. Since the four window posts are slender and easily bent, their stress effect upon the upper chord cannot be much more than 200 lb. If required, their action could be considered, as is indicated later in this discussion. For simplicity, however, we will for the present neglect them, and represent the frame as shown in Fig. 3.

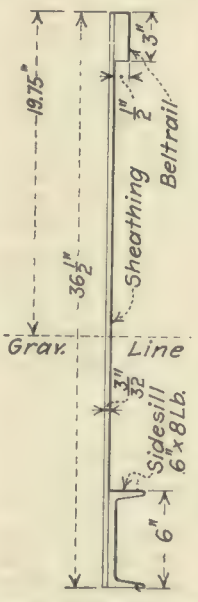
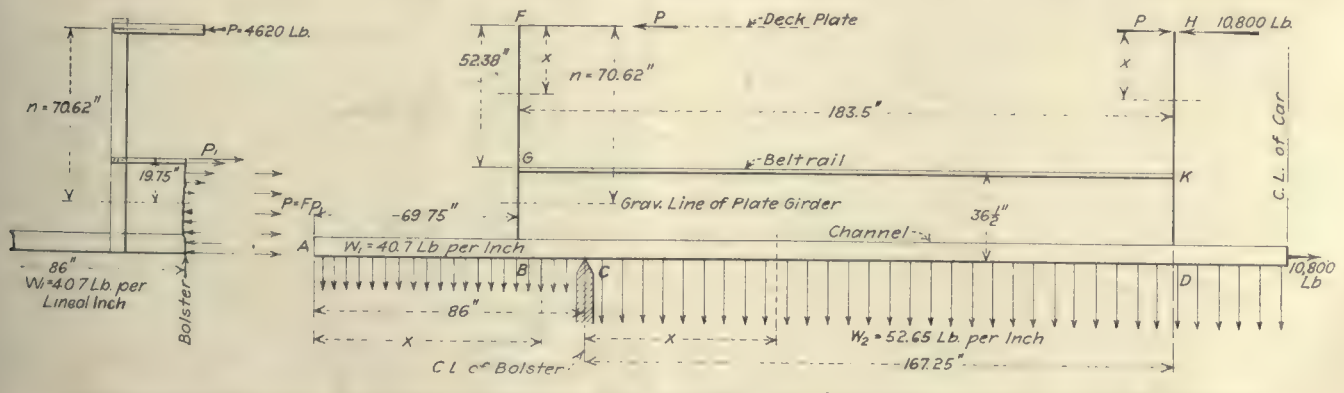


FIG. 1—SECTION OF SIDE GIRDER

Here GF, FH, and HK are the center lines of the corner post, upper chord and door posts respectively. The lower part GD is to be considered as a plate girder. The required dimensions, as far as they could be obtained, are given in the figure. With the loading uniformly distributed, the load outside the bolsters comes to 40.7 lb. per linear inch, while inside the bolsters it is 52.65 lb. per linear inch. The reaction of the bolster equals 14,150 lb. Also let I equal the moment of inertia of plate girder, or 1352 in.⁴; I_1 equal the moment of inertia of end post FG, or 169 in.⁴; I_2 equal moment of inertia of center post HK, or 327 in.⁴; F equal the area of section of plate girder, or 7.30 sq. in.; F_1 equal the area of section of deck plate, or 1.44 sq. in.

It is evident that Fig. 3 is an illustration of an indeterminate truss. The unknown stress in the upper chord is represented by P. The problem now is to find the value of P. This cannot be found by simple statics, but by using integral calculus the "Principle of Least Work" can be applied.

According to the principle of least work, of all the values that P might have, only that one is admissible which will make the total internal work done by the members a minimum. Let W represent the total internal work; then the true value of P that will make W a minimum is found by writing $\frac{dW}{dP} = O$. The ex-



STRESS ANALYSIS—FIG. 2, STRESS IN SECTION OVER BOLSTER; FIG. 3, DIAGRAM SHOWING FORCES THAT ACT ON CAR FRAMING

pression for W consists of a number of terms. Since we differentiate with respect to P we need to consider only those terms that will involve P. Any term that does not contain P will drop out in the differentiated expression. The work of shear need not be considered since the shear in the plate girder is not a function of P. This gives the following equation:

$$\frac{dW}{dP} = \int_B^C M \frac{dM}{dP} \cdot \frac{ds}{EI} + \int_C^D M \frac{dM}{dP} \cdot \frac{ds}{EI} +$$

$$\int_F^G M \frac{dM}{dP} \cdot \frac{ds}{EI_1} + \int_H^K M \frac{dM}{dP} \cdot \frac{ds}{EI_2} + \frac{Pl}{EF_3} + \frac{Pl}{EF} = O$$

The first term gives the internal work done between B and C due to the bending of the girder, and, omitting the details of integration, this equals $\frac{105{,}400 + 60P}{E}$. The second term is the work done between C and D due to bending of girder, and this equals $\frac{617P - 4{,}332{,}000}{E}$. The third term is work due to bending of end post FG, equalling $\frac{283.5P}{E}$. The fourth term is work due to bending of door post HK, and this equals $\frac{-1{,}583{,}000 + 146.5P}{E}$. The fifth term is work due to compression in member FH, or $\frac{127.5P}{E}$ and the sixth term is work due to tension in girder, or $\frac{25.2P}{E}$.

If these values are substituted in the equation and this equation is simplified, we will obtain, since the factor E divides out, $1259.7P = 5{,}809{,}600$, or $P = 4620$ lb.

The value is considerably larger than that given by Mr. Johnson. As stated above, the influence of the window posts was neglected, since this influence is small. If this influence is considered it will increase the value of P a little. If desirable, the effect of the window posts can be included. In that case we will have five unknowns, and can obtain five equations similar to the equation above, and involving these five unknowns. The solution of these equations gives us the required five quantities. This involves considerable labor and it seems hardly necessary.

It may be of interest to determine the stresses in a section over the bolster. To do so, pass a section through the truss over the bolster and represent the forces as shown in Fig. 2. The forces acting on the girder consist of a shear (not represented), a system of forces forming a couple, M, equal to $\frac{p_2 I}{19.75}$ (where p_2 equals stress in outer fiber due to bending), and a uniformly distributed force, P, $= p_1 F$. If now moments are taken about the neutral axis of the girder $\frac{p_2 I}{19.75} = 4620 \times 70.62 + W_1 86^2/2 = 477{,}800$ in. lb. and $p_2 = 6980$ lb. per square inch. Also $p_1 = \frac{4620}{7.30} = 633$ lb. per square inch.

The total unit stress in outer fiber then equals $p_1 + p_2 = 7513$ lb. per square inch. The belt rail has a sectional area of 1.5 sq. in. The approximate stress in the belt rail then is $1.5 \times 7513 = 11{,}250$ lb.

It is not intended by this article to question the sizes of members in Mr. Johnson's design, but merely to show how the stresses might be found by another method. One advantage is that it can be used even if there is more than one redundant member in the truss, such as the deck plate in this case. The above calculations are based on a live load uniformly distributed over the whole car. If we had assumed the platforms empty, the stress in the upper chord would have been about 4000 lb., according to Mr. Johnson's method, and about 30 per cent higher according to the method here given.

E. W. RETTGER and S. G. GEORGE,
Assistant Professors Applied Mechanics.

The "WE" Slogan Sign

KENTUCKY TRACTION & TERMINAL COMPANY
LEXINGTON, KY., Jan. 27, 1915.

To the Editors:

I think that you may be interested in our "WE" slogan sign, which I am forwarding you. These signs we have been giving to the truckmen, merchants, conveyances of any and all character, and automobiles, with the request that they be carried on the conveyance and in this manner enlist them in the campaign. This sign, as you will



"WE" SLOGAN SIGN

note particularly, is not directory but implies that the initiative is being taken by the truckmen and is not fostered by the railroad interest.

Stop to consider the number of accidents, steam and electric, which have come under your direct attention, and probably many of which may be acquaintances, and you will realize the value of this slogan, which we feel is the most forcible thing we have brought forward in our "safety first" campaign.

F. W. BACON, Vice-President.

Commission Report on Electric Interurban Lines of Iowa

According to the thirty-sixth annual report of the Board of Railroad Commissioners of Iowa, for the year ended Dec. 1, 1913, the gross earnings from operation for the electric interurban lines of the State amounted to $2,330,385, as compared with $1,823,191 for the year previous. The operating expenses increased from $1,272,340 in 1912 to $1,453,624 in 1913, while the net earnings from operation increased from $550,851 in 1912 to $876,761 in 1913. The net earnings per mile in 1912 were $1,607 and in 1913 $2,224. The interurban mileage (single track) increased from 342.74 miles in 1912 to 394.23 miles in 1913. The outstanding capitalization per mile in 1913 was $39,832 for stock and $38,333 for bonds, as compared to $40,443 and $33,356 in 1912, respectively.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Committee Activities Continue as Middle of Association Year Approaches—Claims Association Selects Subjects for Convention Program—Block Signal Committee Especially Busy

JOINT COMMITTEE ON BLOCK SIGNALS

Meetings of sub-committees on block signal details were held at association headquarters on Jan. 26 and 27. Members of the committee in attendance were: J. M. Waldron, New York; J. W. Brown, Newark, N. J., and G. N. Brown, Syracuse, N. Y. Others in attendance by invitation were C. L. Cadle, Rochester, N. Y.; R. V. Collins, United States Signal Company; S. N. Day, General Railway Signal Company, and H. W. Griffin, Union Switch & Signal Company, who gives the committee valuable suggestions. The important matter taken up on Tuesday was the preparation of a form of statistical blank for the recording of signal maintenance cost reports. This will be submitted to the convention next October. A suggested list of requirements for trolley-contact signal operation was presented by Mr. Collins and this was discussed in detail, being accepted for further consideration by the committee.

At the meeting on Wednesday the discussion on the data sheet was continued, and, as an aid to simplifying this and providing for uniformity in the replies, a complete classification of signal operations was prepared. This provided tentative plans for expressing signal efficiency which would serve as a basis for comparing the data that would be obtained through the use of the proposed data-sheet. A proposed outline of information that should be supplied when requesting quotations upon new signal installations for interurban lines was also discussed, and changes were made in the standard clearance diagram for semaphore signals that had been submitted at the 1914 convention and referred back to the committee.

CLAIMS ASSOCIATION EXECUTIVE COMMITTEE

A meeting of the executive committee of the Claims association was held in Washington on Jan. 29. Those present were: W. Tichenor, Indianapolis, Ind., president; R. E. MacDougall, Rochester, N. Y., vice-president; S. B. Hare, Altoona, Pa., vice-president; B. B. Davis, Columbus, Ohio, secretary-treasurer; P. C. Nickel, New York, N. Y., and Wallace Muir, Lexington, Ky. A list of subjects for the 1915 meeting was prepared as follows: A card index and what it means; safety and its relation to conservation; motor vehicles (details to be announced); standard classification of accidents. The committee on the last-named subject consists of Messrs. Nickel, H. K. Bennett and H. V. Drown, of whom Mr. Drown is a recent addition. The authors of papers are to be selected by the president and the secretary.

POWER DISTRIBUTION

The sub-committee of the committee on power distribution, to which had been assigned the preparation of standard specifications for overhead line material, met in New York on Jan. 28. There were present C. R. Harte, New Haven, chairman; C. L. Cadle, Rochester; C. F. Woods, Boston, and G. W. Palmer, Boston. The sub-committee discussed in detail the possible schemes for grouping the different specifications for various parts of overhead construction so that they might be most easily available for use in permanent form, and a schedule covering the scope of the work was prepared. Tentative general specifications for material had been prepared by Mr. Harte and these were considered in detail by the sub-committee as a whole and approved with certain modifications. Detailed specifications for wrought iron and steel were then taken up, together with requirements for such parts of the usual types of overhead construction as are made wholly of these materials and which, in consequence, fall naturally under this general heading. This subject was extended into an evening session without being completed and it was decided to hold another meeting of the sub-committee on Feb. 25, the meeting to be carried over to the following day if necessary.

COMMITTEE ON STANDARD CLASSIFICATION OF ACCOUNTS

A meeting of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association was held in Washington on Jan. 27 and 28. Those in attendance were: H. L. Wilson, Boston; W. F. Ham, Washington, D. C.; R. N. Wallis, Fitchburg, Mass., and W. H. Forse, Jr., Anderson, Ind., representing the Accountants' Association, and F. W. Sweeney and George Geekie, representing the Interstate Commerce Commission. These gentlemen spent two days in preparing the manuscript of a case book, based on the new classification. This book will publish all of the questions in the old case book and will apply them to the new classification. There will also be some two hundred additional questions in regard to the classification of accounts, which will be answered according to the basis of the new classifications. The case book will carry a complete index both of subjects and case numbers. The manuscript of this book was completed at the meeting of the committee in Washington and it will be issued by the government as soon as it can be printed at the Government Printing Office.

DENVER TRAMWAY SECTION

The January meeting of the Denver Tramway Company Section was held on Jan. 28, having been postponed from Jan. 21, the regular meeting date. The subject for the meeting was "Snow Work and Equipment," the principal paper being presented by W. H. McAloney, superintendent of rolling stock. This was discussed by J. M. Tierney, W. L. Whitlock, A. M. Evans, J. J. Foster, A. J. Krick and R. L. Baker. Mr. McAloney used a large number of lantern slides to illustrate his talk, in which the audience of 200 was intensely interested. Preceding the formal part of the program the Central Tramway Glee Club gave a brief entertainment.

COMING COMMITTEE MEETINGS

Feb. 11, New York, 10 a. m., standards committee of the Transportation & Traffic Association, L. H. Palmer, Harrison Williams Company, New York, chairman.

Feb. 11, New York, 10 a. m., rules committee of the Transportation & Traffic Association, W. H. Collins, general manager Johnstown & Gloversville Railroad Company, Gloversville, N. Y., chairman.

A meeting of the committee on way matters of the Engineering Association, C. S. Kimball, engineer maintenance of way Washington Railway & Electric Company, Washington, D. C., chairman, will probably be held in New York before the end of February.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Electrolysis Develops Defects in But Three Out of 1500 Concrete Poles

BY H. G. THROOP, SUPERINTENDENT LINE AND BUILDINGS NEW YORK STATE RAILWAYS, UTICA-SYRACUSE LINES

Several articles have been published dealing with the effect of stray electric current upon concrete poles. A recital of our experiences in this line may be of some benefit to users of this type of pole.

Out of a total installation of some 1500 reinforced concrete poles placed during the last five years, three poles have developed defects, which, upon investigation, proved to be directly traceable to the flow of current through the reinforcing rods to the ground.

The first case was indicated by a vertical crack extending from the top of the pole to the ground line, from one of the corner reinforcing rods to the surface of the concrete. This pole was one of the first built and was installed in the spring of 1911 and removed in December, 1914. Evidently there had been a leakage of current into this pole for some time, due to a defective strain insulator in the span wire, the current flowing from the eyebolt into one of the corner reinforcing rods, thence to ground. When the concrete was removed from the reinforcement of this pole, the rod in contact with the eyebolt was badly oxidized, and below the ground line some 2 ft. of this rod was entirely eaten away. Within the portion of the pole which was buried in the ground the current had communicated through the damp concrete to the other rods, which were all badly oxidized. The concrete above the ground line had been so loosened from the oxidized rod that this concrete would in time have fallen away from the rod.

The second case was that of an extra heavy 8-in. top corner pole, into which there had been a gradual leakage of current. This leakage resulted in the spalling of the concrete below the ground line to such an extent that the grip of the concrete on the reinforcement was badly weakened. Due to its weakened condition this pole had been pulled 1 ft. out of line by the trolley pole of a passing car catching into the attached curve.

The third case showed spalling of the concrete below the ground line, but had not resulted in failure when the pole was removed for other reasons.

CONCLUSIONS

All of the foregoing cases of failure were due to leakage of 600-volt trolley current through defective hangers and strain insulators.

The evident remedy for the conditions cited is to insulate the pole completely by placing in the spans the proper strain insulators. Poles removed for other causes than defects have been knocked to pieces and all of their rods have been found to be in perfect condition.

In favor of this type of pole it may be stated that in all of the foregoing cases ample warning was given by the gradual spalling and cracking of the concrete, and all of the poles mentioned would have supported their load in safety for some time after the defects were detected.

Case-Hardened Collar and Welding Reclaim Worn Button-End Axles

BY A. R. JOHNSON, ASSISTANT TO SUPERINTENDENT OF EQUIPMENT THIRD AVENUE RAILWAY SYSTEM, NEW YORK

Some two or three years ago the Third Avenue Railway System had much trouble from broken check plates on the No. 22-E trucks used on lines in the outlying districts. This trouble was entirely overcome by substituting a check plate made of manganese bronze, but

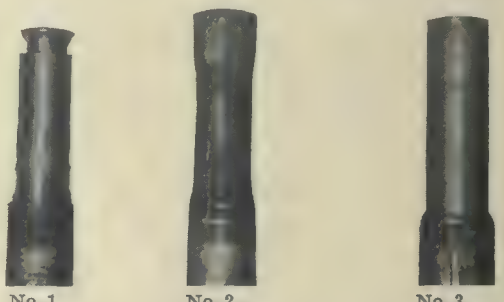


FIG. 1—WORN, WELDED AND FINISHED AXLES OF THIRD AVENUE RAILWAY SYSTEM

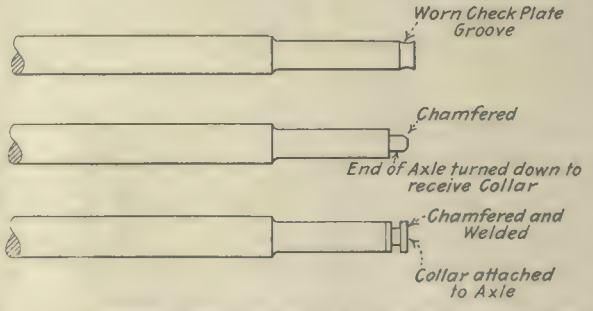


FIG. 2—STEPS IN APPLICATION OF CASE-HARDENED COLLAR TO A WELD-REPAIRED AXLE

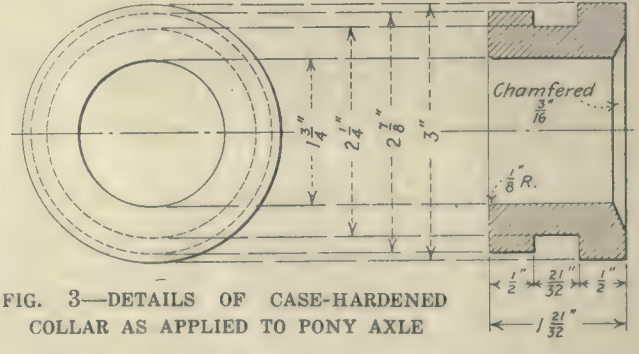


FIG. 3—DETAILS OF CASE-HARDENED COLLAR AS APPLIED TO PONY AXLE

it was then found that the hard wearing qualities of that material caused much wear in the check plate grooves on the axles. In fact, a number of them wore to a knife edge, as shown in No. 1 of the accompanying half-tone, Fig. 1.

To save the axles from the scrap pile we used our electric welding plant to fill in the grooves, as indicated by No. 2 of Fig. 1, and then turned the axles down, as

shown by No. 3 of Fig. 1. While this treatment added to the life of the axles, the welded material also wore off in time. The question of reclaiming these axles, therefore, came up a second time with the result that we decided to try the scheme of attaching a case-hardened collar on the end of the axles, as shown in Figs. 2 and 3. This collar consists of a piece of steel which is case-hardened to a depth of 1/16 in. in the grooved part only. The axle is turned down at the end for a distance of $1\frac{21}{32}$ in. and chamfered for 3/16 in. at the extreme end. The collar is arranged for a driving fit. The outer end of the collar, as shown in Fig. 3, is also chamfered to permit filling in the welding material to insure rigidity and to prevent the collar from turning on the axle.

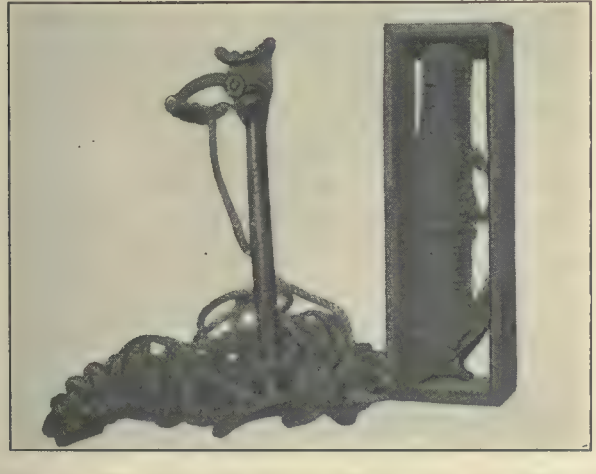
Up to the present time the practice described has been in an experimental stage, but the results so far obtained have proved very satisfactory. One car on which this collar was applied to the axle had made more than 3000 miles in hard service up to Feb. 1 of the current year and still showed no sign of wear or other possible defects.

Trolley Wire Pick-Up

BY HARRY BRANSON, SUPERINTENDENT OF EQUIPMENT LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

All cars of the Lehigh Valley Transit Company are now being equipped with trolley wire pick-ups designed to handle dropped trolley wires without danger. The accompanying halftone shows this device in its case on the right, while on the left it is shown ready for use in an emergency.

The instrument consists of a well-seasoned staff of ash about 18 in. long and 1½ in. thick with a casting mounted on one end to which a lever is pivoted, as shown. On the long end of this lever is fastened about 50 ft. of ⅜-in. rope which passes through a slanting hole in the center of the rod. The top of the casting, which is made with a corrugated curved groove, is inserted under the



TROLLEY WIRE PICK-UP READY FOR USE AND PACKED IN BOX FOR INSTALLATION IN CAR

wire. A pull on the rope will then exert through the lever a firm grip on the wire. The loose end of the rope is thrown over the limb of a tree or other support, the wire is drawn up from the ground and the rope fastened. The car may then continue its run without waiting for repairs to be made to the overhead line.

The pick-up is stored in a pine box fitted with a glass cover. This box is mounted either under a seat in the car or near the roof in one of the vestibules. The glass must be broken to get hold of the pick-up just as in the case of axes for emergency use.

Pine Ties Reused by Street Railway After Twenty-One Years' Service

BY R. C. CRAM, ASSISTANT ENGINEER WAY AND STRUCTURE BROOKLYN RAPID TRANSIT SYSTEM

The average life of the several kinds of untreated ties generally used in steam railroad track structures is now quite well determined. On the other hand, information concerning the life of ties in electric railway service in paved streets is somewhat meager. The conditions governing the two forms of service differ so much that those obtaining in steam railroad service cannot be taken as a guide for electric railway service in streets, and even, to some extent, in private right-of-way.

The ties in steam railroad service are constantly exposed to alternate variable wet and dry conditions; they are subject to very heavy stresses due to the great weight of the steam railroad equipment; they are subject to mechanical injury from more or less constant tamping. On the other hand, those in the street railway service are usually in a comparatively uniform state with respect to variation in moisture content, owing to the protection from evaporation afforded by the paving; they are subject to much lighter loads, and are seldom retamped after their installation. It is conceded that the life of tie timber is greatly increased under the latter conditions.

The character of the soils in streets may affect the life of the ties to a considerable extent, but the increasing use of concrete in the track structure undoubtedly helps to preserve ties against decay, providing fungi or fermentation are not present at the time of installation, and should offset variable soil action and add materially to the ultimate life obtained.

Fred G. Simmons, then superintendent of construction, The Milwaukee Electric Railway & Light Company, stated at the 1906 convention of the American Street & Interurban Railway Engineering Association that he had taken up tracks laid with red-cedar ties which were from sixteen to eighteen years old and that he was putting back between 40 per cent and 60 per cent of them into the tracks, surrounding them with concrete.

Tie Life in Brooklyn

The reconstruction of surface tracks carried out in Brooklyn during the past season afforded an opportunity to investigate this subject. Observation was made covering nine different streets in widely separated territory involving altogether about 15 miles of single track.

The tracks removed were constructed almost uniformly with 9-in. tram girder rail, having a base 5½ in. wide, spiked to 6 in. x 8 in. x 7 ft. sawed long-leaf yellow pine ties spaced 2 ft. 6 in. on centers, with brace tieplates spaced from 6 ft. to 8 ft. apart. In every case the tracks were paved and had been since construction, mostly with 8-in. deep granite blocks laid on sand, with sand joints. In three of the streets the original pavement had been replaced within the last six or seven years with an improved type, involving the use of the same blocks laid with grouted joints on cinder concrete.

No attempt was made to count the old ties removed, but careful check was made on the average spacing. The estimated number of ties removed was found to be about 33,000. Upon arrival at the storage yard the ties were counted and selected for use as second-hand stock, being later reissued and used, in some cases, in rehabilitated tracks where old rails were left in place and new grouted pavement was being installed.

The count at the yard showed that there was an average loss of about 24 per cent of the estimated number of ties between the street and the yard. In one or two instances the losses were so high that, considering the neighborhoods, they could only be accounted for as being due to their being appropriated for firewood. It is also patent that a fair number were destroyed in removal and went direct to dumps in the clean-up.

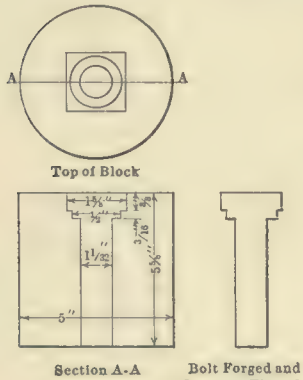
However, the interesting features are that the average age of the ties taken into stock was 18.6 years; that 72 per cent of the ties which were sorted were taken into stock, representing 54 per cent of the estimated total number removed from the street; that the ages ranged from sixteen to twenty-one years; and that in one case 94 per cent of ties sixteen years old which were sorted went into stock, or 82 per cent of the estimated original number in that street.

When all the features are considered it seems reasonably safe to assume that at least 60 per cent of the total number of ties would have been fit for stock if all of them could have been recovered. It was also observed that as a rule there was comparatively little damage to the ties due to rail cutting, especially when the 5½-in. base and old tie spacing are borne in mind.

Handy Forming Blocks for GE-57 Motors

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTERURBAN RAILWAY, ROCKFORD, ILL.

During the cold weather we have had much trouble from the breakage of steel motor bolts. Such failures allow the motor case to drop and, worse than that, the armature occasionally will fall on the pole pieces. To overcome this we had lately been making these bolts from 1⅝-in. square Swedish or Farnley iron, both of which brands are very costly. Further, with the usual methods of operation much material was lost in turning these bolts from the square iron and much time was required, thus making the bolts very expensive.



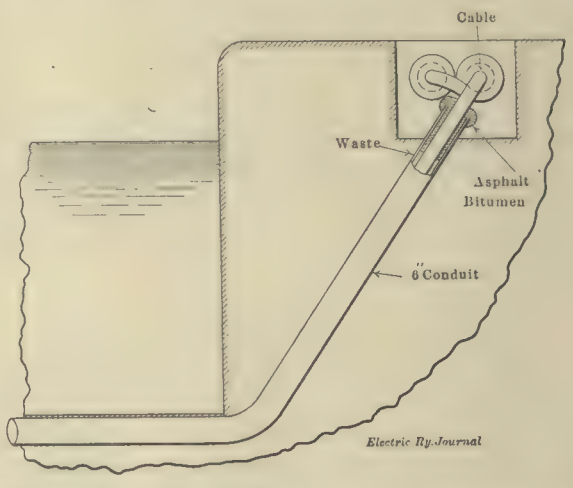
FORMING BLOCK FOR GE-57 MOTOR BOLTS

To make such bolts at a lower cost we now use a block made from a piece of an old steel axle in which the bolts can be forged from round bars of the tough steels named at a big saving in material and time. The block, as illustrated, is easily made as follows: First cut off a piece of an old axle a little longer than the length of the bolt over the head, then face off both ends in a lathe to the exact length of the bolt over the head. Next allow the block to remain in the lathe for a 1 1/32-in. drilling of its full length. After drilling the block counterbore for the round shoulder on the head of the bolt. Then take the block from the lathe and chisel it out to receive the square part of the bolt head. The block is then ready for use. Place it on an anvil or forming block, heat one end of the 1-in. round iron of which the bolt is to be made, drop it in the block with the cool end down, sledge the hot end down to form the head of the bolt, drive the bolt out of the block as soon as it is formed and allow it to cool slowly. Never cool in water. When cool the bolt is ready for threading.

Preventing Condensation in Under-Water Conduit

BY J. G. KOPPEL, ELECTRICAL SUPERINTENDENT OF BRIDGES, SAULT STE. MARIE, MICH.

The accompanying illustration shows a 6-in. cast-iron power cable conduit which is laid under a canal. It was found that a large amount of water had accumulated in this conduit from the condensation of entering air. This water does no damage so long as the lead covering of the cable stays in good shape, but if the lead sheathing is damaged a little, as when the cable is pulled through the conduit, water becomes very troublesome.



UNDER-WATER CONDUIT SEALED WITH ASPHALT-BITUMEN TO AVOID CONDENSATION

To stop condensation we now seal the conduit ends with asphalt-bitumen. About 12 in. from the end of the conduit we insert a piece of clean waste to keep the bitumen from running too far down the conduit. The material is hot-poured and the end of the conduit is sealed neatly to make a good-looking job.

Accident Reduction on the Third Avenue Railway System

The following table shows a number of boarding and alighting accidents and settlements for same for 1913 and 1914 for the Third Avenue division of the Third Avenue Railway. This includes the Third Avenue road proper, 125th Street line and the Kingsbridge line.

TABLE SHOWING ACCIDENTS AND SETTLEMENTS ON THIRD AVENUE DIVISION

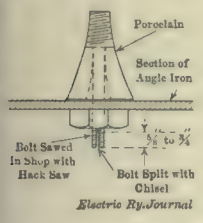
	1913. Old Style Cars				1914. New Type Cars			
	Boarding		Alighting		Boarding		Alighting	
	Accidents	Settlements	Accidents	Settlements	Accidents	Settlements	Accidents	Settlements
Sept.	70	$1,245	33	$892	14	$235	30	$360
Oct.	100	1,790	34	1,335	14	75	41	375
Nov.	72	2,412	47	1,300	17	80	31	235
Dec.	97	1,370	48	2,140	19	61	38	140
Totals	339	$6,817	162	$5,667	64	$451	140	$1,110
Increase					...		...	
Decrease					275	$6,366	22	$4,557

The division mentioned was equipped throughout with the folding door and step device of the Prepayment Car Sales Company in August, 1914, and the railway company attributes the reduction in the number and serious character of the boarding and alighting accidents entirely to this improvement. It will be noticed the number of boarding accidents decreased 275 and the alighting accidents 22, the whole reduction in settlements being $10,923, or about 88 per cent.

Experience with Malleable Iron Cross-Arms on Wooden Poles

Late in the year 1908 the New York State Railways-Rochester Lines, on what was then known as the Rochester & Sodus Bay Railway, superseded the long-leaf yellow pine cross-arms with steel-iron arms. The first installations were made on lines up to 13,000 volts, but since then the same construction has been applied to transmission lines as high as 20,000 volts. In all cases the lines are carried on cedar, chestnut or concrete poles.

The wooden cross-arms cost only 35 cents each, but as their life did not extend beyond five years it was necessary to replace them at a cost of $1 per arm for labor alone. To eliminate this maintenance cost for good, C. L. Cadle, electrical engineer of the company, decided to try steel-iron cross-arms. While these arms cost 76 cents each as compared with 35 cents for wood, they are far cheaper in the end because they will last as long as the pole. Thus, for a pole life of fifteen years the cost of wooden arms is $4.05 and that of steel $1.76. These angle-iron arms are purchased under a specification which calls for hot galvanizing after the holes have been drilled, thus avoiding the possibility of rust. The company buys the arms in the open market, but quite a portion of those now in service came from the Archbold-Brady Company, Syracuse, N. Y. Two constructions of this character, one for single-line 13,000-volt and one for double-line 20,000-volt service, are shown in accompanying drawings. It should be understood that the braces and other fittings used with the steel arms do not differ to any degree in character or price from those which were used with wooden arms.



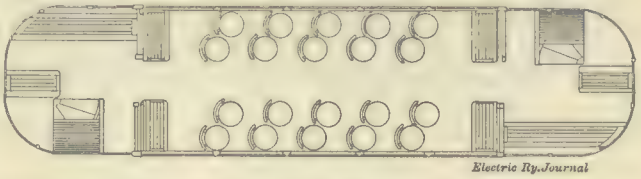
SAWED AND SPLIT BOLT

The only point of importance which came up after the first change-overs were made was how to prevent the nuts from working off of the pins. First, the company tried a spring washer at the bottom of the nut, but the nut would back off from the washer. Next a cotter key was tried, but in this construction the nut eventually wore the key in two. Finally, about three years ago, the following scheme, which has cured the trouble entirely, was devised:

Before the bolts are taken to the field, they are hacksawed for ⅝ in. to ¾ in. on that portion which will come below the nut. Then after the nuts have been applied on the job the sawed portion is split with a cold chisel just enough to prevent the bolt from losing its spring while assuring enough expansion to give the effect of a locknut. In fact, while the nut cannot work off of its own accord, it can readily be unscrewed by the lineman for use somewhere else, and of course there is no other part to remove first, as would be necessary in cotter-key fastenings.

Front Exit Glasgow Double-Deck Car With Folding Step

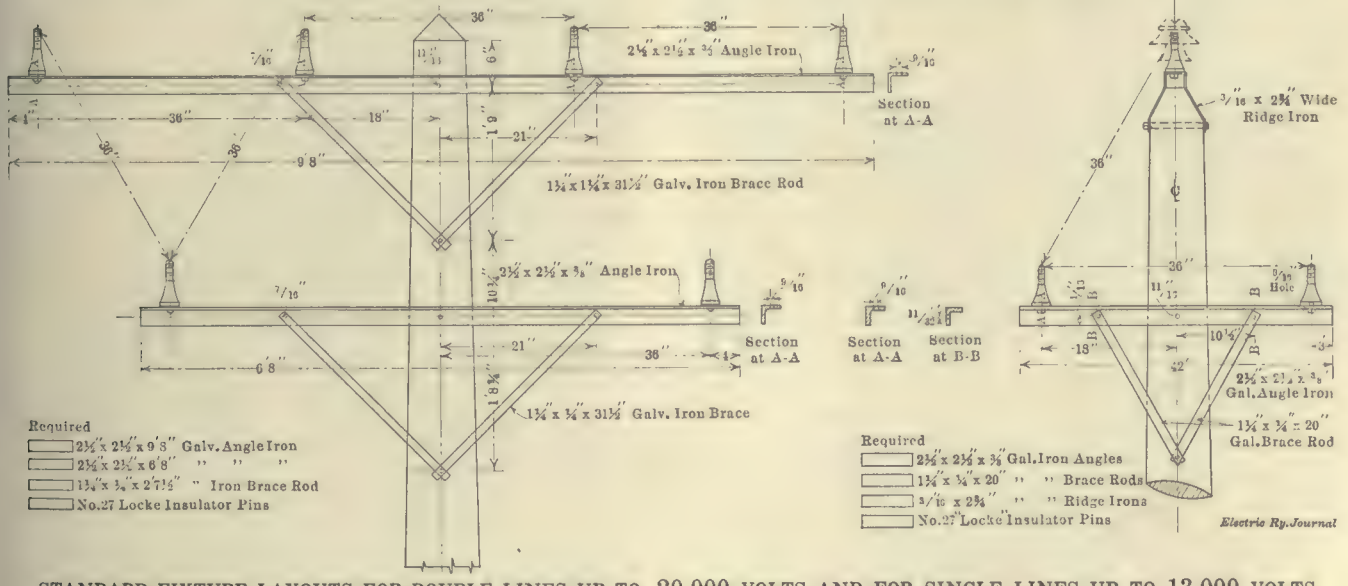
The Glasgow Corporation Tramways has recently added to its rolling stock a double-deck car, the chief features of which are a front exit for inside passengers and a new design and arrangement of the upper-deck seats. The car body and platform are built to the standard design adopted by the tramways committee many years ago. The length of the car body is 17 ft. and the length of each platform is 6 ft.



PLAN OF UPPER DECK OF CAR, SHOWING REVOLVING SEATS

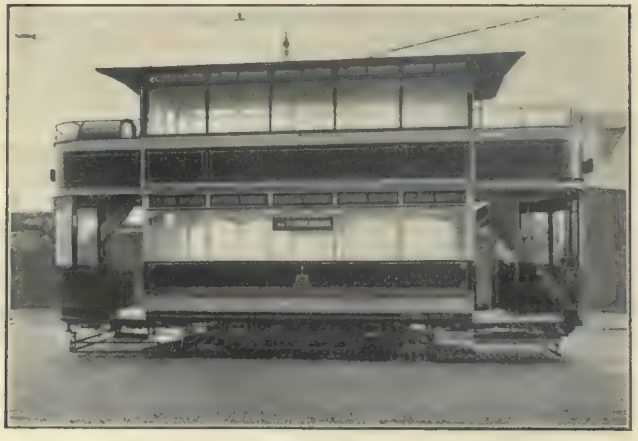
In the original design the top of the stair is fitted hard against the car body, leaving accommodation at the foot of the stair for placing the controller close up to the dashboard. In the new design, the stair is moved away from the body of the car, in order to provide the necessary headroom between itself and the car body, free access being obtained at the foot of the stair by moving the controller about 20 in. away from the dashboard. The hand-brake staff is placed at the extreme end of the platform, and a vertical wheel with suitable bevel gearing and folding handle has been introduced in place of the ordinary spindle brake.

The hinged exit gate is geared to the folding step in such a manner that when the gate is open the step is lowered, and when the gate is closed the step is raised.



STANDARD FIXTURE LAYOUTS FOR DOUBLE LINES UP TO 20,000 VOLTS AND FOR SINGLE LINES UP TO 13,000 VOLTS

The arrangement of the top seats, as shown on the plan, was introduced in order to increase the passageway up the center of the car and at the same time to provide a more comfortable seat. By this arrangement, each passenger is provided with an independent chair, with a back rest, mounted on a pivot, so that the chairs



GLASGOW DOUBLE-DECK CAR WITH HINGED EXIT GATE AND FOLDING STEP

can be turned to suit the direction in which the car is traveling. Each pair of seats is set at such an angle that the shoulder of one passenger overlaps the shoulder of the passenger occupying the next seat.

On account of the new position of the stair, it was necessary to increase the length of the upper dashboard



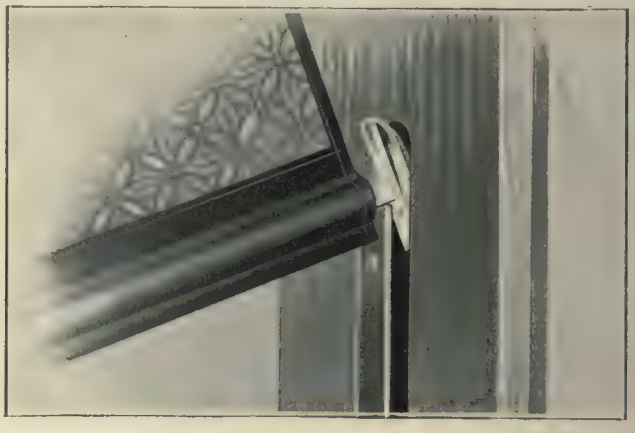
PAIRS OF PIVOTED SEATS ON UPPER DECK OF GLASGOW CAR; NOTE ALSO ABSENCE OF HEADLINING

or wind screen, the effect of which has been to increase the seating capacity under the canopy at each end of the car by one passenger. The seating capacity of the original type of car is sixty-two and in the new car sixty-four.

Local and interurban railways in Cleveland found operation difficult on Feb. 1, because of sleet on the trolley wires and tracks and numerous broken wires Reports from Toledo indicate that similar difficulty was encountered on Feb. 1 and 2. Because of broken trolley wires power was shut off at the plant of the Lake Shore Electric Railway at Fremont and for a time operation of cars between that point and Toledo was suspended.

Curtain Fixtures Without Pinch Handles

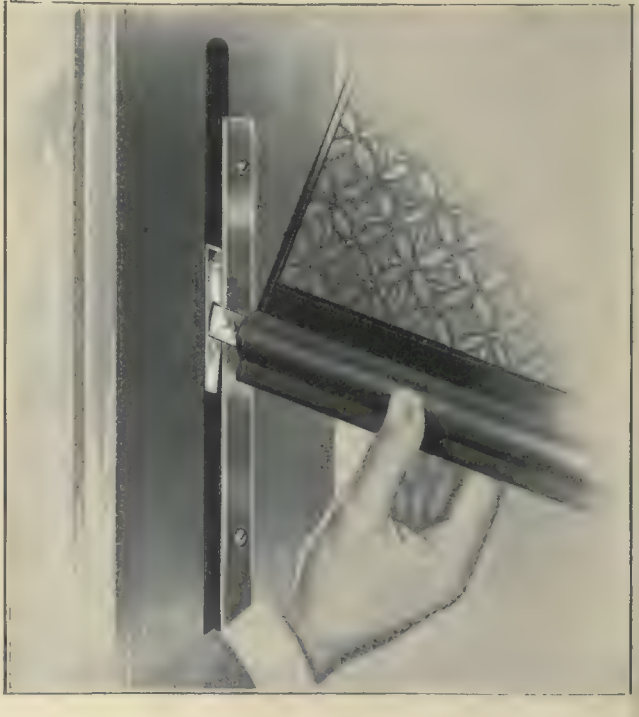
The Dayton Manufacturing Company, Dayton, Ohio, has recently brought out an improved car curtain fixture in which friction shoes bearing in the curtain grooves hold the curtain absolutely at any position. These shoes are pivoted at the ends of spring-pressed plungers, and they will not bind in the curtain grooves, even if the lower edge of the curtain is slanted at an unusual angle.



SHOE EASILY REMOVED FROM GROOVE WHEN NECESSARY

The bottom rod may be grasped at any point with either hand and the curtain raised or lowered smoothly and easily. No pinch handles are necessary.

It is asserted that no matter how rapidly or how roughly the curtain may be operated, the tips cannot be jerked from the grooves, as a metal retaining strip, fastened to the window casing along the edge of each groove, effectually prevents the accidental displacement

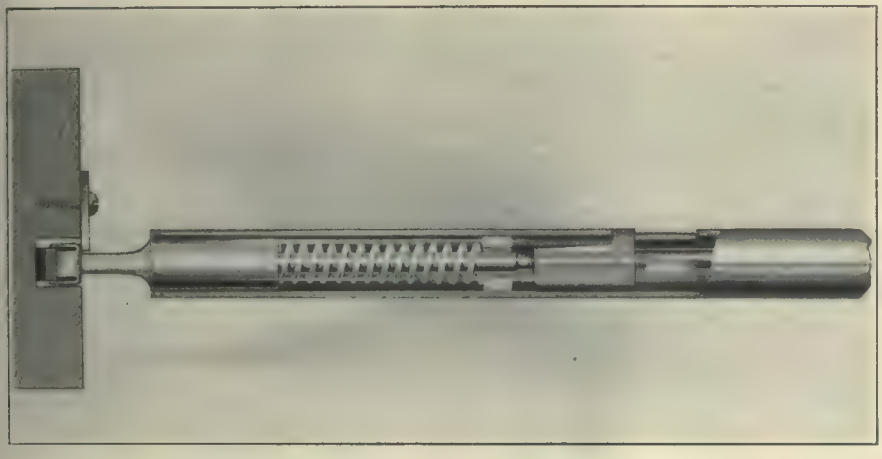


RETAINING STRIP PREVENTS ACCIDENTAL MISPLACEMENT

of the shoes. The tendency of the tips of other types of curtain to leave the grooves if the finger pieces are pressed too strongly, or if the curtain is raised or lowered too rapidly, is a source of much annoyance to passengers and what is more apparent, of considerable damage to the curtain and the finish of the window casing.

The retaining strips, while keeping the shoes in the grooves under all conditions of operation, do not interfere with the ready removal of the curtain when necessary. Each strip terminates 1¼ in. below the upper end of its groove and the friction shoe may be tilted and withdrawn through this opening. However, the shoe is nearly twice as long as this opening and it will not slide out under use. The removal of the curtain must be intentional, in which case it is easily and quickly effected.

The simplicity of this curtain fixture is apparent from the accompanying sectional view. The lower edge of the curtain is formed by a steel tube, in either end of which slides a brass plunger with its shoe. Adjustment of the spring tension and for different widths of window is obtained by screwing this plunger in or out as required, the threaded end of the plunger engaging a long bronze nut, as shown. As the shoes do not extend far below the lower edge of the tube, a long apron is not required and this feature adds greatly to the durability of the fabric.



DETAILS OF CURTAIN FIXTURE EXPOSED IN PART

The "Dayton" fixture does not require a special size of groove as it will operate equally well in the standard size groove, as also in the deeper, wider grooves required by certain other types. This is of importance when fixtures are being specified for the remodeling of old cars.

The retaining strips may be enameled to suit the color of the woodwork or they may be finished to match the other bronze trimmings of the car.

This company's curtains will be regularly made from "Fabrikoid," a durable curtain material, which can be supplied in all shades, and in a wide variety of patterns, or to match any curtain material now in use. All curtains are fitted with metal rollers.

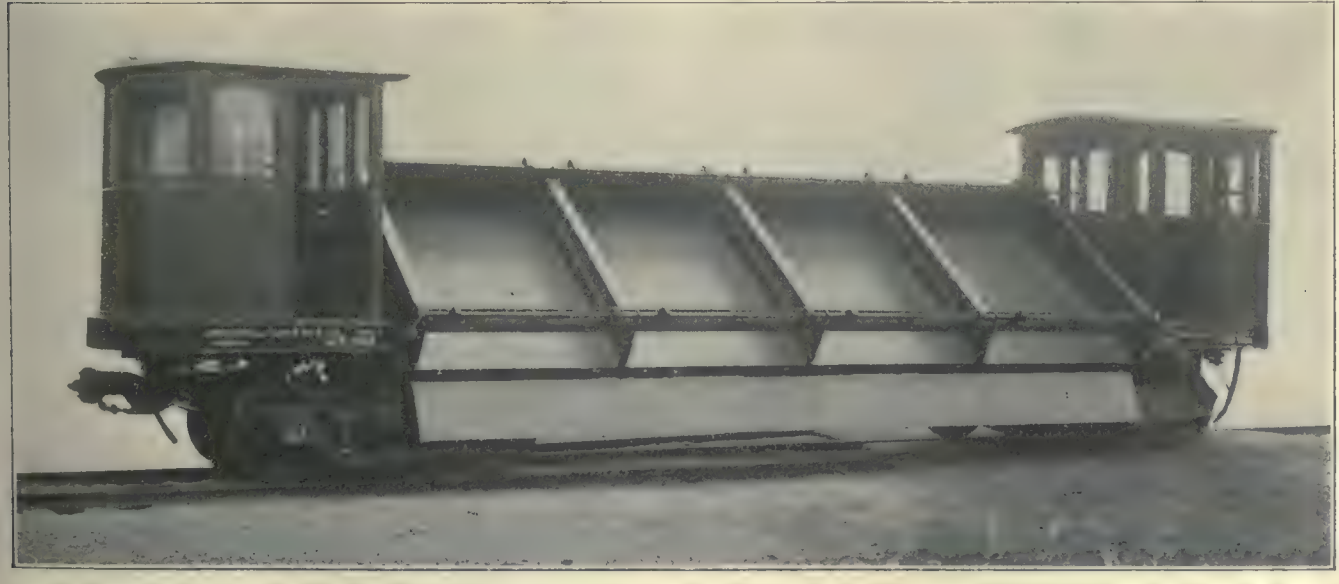
Two-Way Dump Cars

The "Universal" is the name of the modern two-way dump car built by the Universal Car & Manufacturing Company (Inc.), New York. With the exception of the cabs this car is constructed of rolled-steel sections and plates throughout, and it may be used either as a motor car or as a trailer. In trailer cars the cabs are usually omitted. The car dumps to either side and is operated entirely by hand power. As it is mounted on the underframe by means of cast-steel rockers the car comes to its full angle with little or no shock, and it is easily righted when the load is discharged. The entire dumping and righting operation is performed within two minutes.

The doors open automatically when the car is dumping and, as illustrated, form an apron for the lading to pass over, thus throwing the load entirely free of the track. A spreader is also attached to the rear truck as a further aid in pushing the material away from the track. The car may be dumped in an empty position and then loaded by hand and righted. This is a decided advantage as the lift from the roadway to the top side of the car is only 4 ft., which is easy for men using shovels.

The car has four compartments, each of which may be dumped separately if so desired. The car may also be dumped in normal running position without tilting the body. When partitions are not wanted the company substitutes a diaphragm only 4 in. high, thus allowing long material to be hauled. Any type of couplers may be used and, if desired, air brakes may be added. The body may also be mounted on the railway's standard trucks.

Cars of this type are used on several of the largest electric railways in the United States, such as the Connecticut Company, the Boston Elevated Railway, Cleve-



TWO-WAY DUMP CAR OF STEEL CONSTRUCTION EXCEPT CABS, AND MADE FOR MOTOR OR TRAILER USE

land Railway, Bangor Railway & Electric Company and the Public Service Railway. Charles H. Clark, engineer maintenance of way Cleveland Railway, estimates the earning power of one of these cars to his company as $100 a day. Since this car requires only the motorman and conductor for unloading, its superiority to the old-time hand-loaded flat car is manifest. For example, it costs one Eastern system about $2 to unload one flat car.

The principal data on a typical two-way dump car follow:

Cubic capacity level full	15 cu. yd.
Length over end sills	50 ft.
Length inside box	25 ft.
Width inside	8 ft.
Height from top of rail to top of floor	5 ft. ⅜ in.
Height from top of rail to top of side	6 ft. 1⅜ in.
Truck centers	25 ft. 6½ in.
Height inside	25 in.
Weight (without electrical equipment)	33,000 lb.

Sand-Spreading Wagon for Slippery Pavement

Officials of the Louisville, Ky., Railway have been watching the efforts of the Board of Public Works to improve the condition of the streets in the business section by means of a sand-spreading wagon. This wagon, which is made by the Havass Company, New York, N. Y., feeds sand through a revolving disk under the wagon bed. It can be adjusted to throw sand at any desired rate. It has been put to work on wood block and certain asphalted streets, the surface of which has been made very slippery by the continued cold weather.

In the sections where this wagon has been put into service the railway has double tracks, which, of course, are affected by the same conditions that make the streets slippery. If the sand distributed by the city is of the right quality, dry and sharp, it will lessen the railway's own requirements for sand; if it is a low grade of sand, the railway's "slick rail" troubles probably would be increased. However, the city is now using a sharp, clear river sand similar to that used by the railway, if for no other reason than that clayey, wet sand would not run through the new machine.

Direct-Current Generator Capacity

In an article in the *Electric Journal*, B. G. Lamme, chief engineer Westinghouse Electric & Manufacturing Company, commented on direct-current generators as follows: The engine-type machine in its prime was a magnificent piece of apparatus. On account of its low speed, it was of comparatively large dimensions for a given output. In the largest capacity, low-speed engine-type generators, over-all dimensions of from 25 ft. to 27 ft. were attained. However, these machines were midgets, both in size and capacity, alongside some of the a.c. engine-type generators at their maximum. The latter were constructed up to capacities of from 5000 kw to 6000 kw compared with 3000 kw for direct current, while the engine-type alternators attained over-all diameters as high as 42 ft. Incidentally, as regards capacity alone, the race between alternators and d.c. machines has been very much one-sided, almost since the polyphase system became thoroughly commercial. The earliest Niagara generators (constructed in 1893), of 3750 kw were practically of as large capacity as the largest d.c. machine ever built; while in later polyphase work, generators of the usual multipolar construction have been built up to 17,000 kw and turbo-generators up to 30,000 and 35,000 kw. Obviously, as regards maximum capacity, the d.c. generator makes but a poor comparison, but this should in no way detract from the appreciation of this machine as an energizing accomplishment.

Electric Garment Dryer Conserves Health and Schedules

For many years the Brooklyn Rapid Transit System has provided employees' clubrooms in which, among other conveniences, lockers and shower baths are installed. Through its benefit association and medical inspection service, however, the company found that these facilities were insufficient to ward off the illnesses that follow when men stay in wet clothing after coming in from a storm. Very few platform men would be likely to keep an extra suit of clothing at the clubrooms, nor is it convenient for them to go home between runs for that purpose.

To better this condition the company tried out nearly two years ago, an electric garment dryer of the style shown in the accompanying illustration. This device thoroughly dries wet clothing in the time that a man requires for a bath. The results in keeping men from becoming ill and so missing their runs, to say nothing of the comfort afforded, were so satisfactory that seven more dryers have now been installed by the company at different stations.

The dryers are made to fit any desired location. Their racks pull out individually, traveling on the floor, either



ELECTRIC GARMENT DRYER IN SERVICE, ONE RACK DRAWN OUT TO SHOW HANGER

inside or outside of the dryer. The construction is such, that each rack when pulled out its full length, closes the aperture, retaining the heat within the dryer and giving constant drying efficiency to the garments inside, while other racks are being loaded or removed.

While the dryers are ordinarily 7 ft. long and about 7 ft. 6 in. high, their dimensions may be varied to contain the necessary numbers of racks for the sizes of the crews, etc. Each rack is 16¼ in. wide, with a hanging capacity of five complete suits of underwear, linen and uniforms. The dryers have a double casing, insulated to prevent radiation of heat. In addition to the natural ventilation provided, added drying efficiency is obtained by forced draft circulation from a fan motor.

The first use of these dryers in the connection described is to be credited to the Brooklyn Rapid Transit System, although different types have been in use for some years in various municipal fire and police department houses. They are available as conditions demand for heating by electricity, coal, gas or steam. These dryers are made by the Shannon Manufacturing Company, New York, N. Y.

LONDON LETTER

P. A. Y. E. Cars Successful in Aberdeen—Last of London Horse Tramways to Give Way to Electrified Lines

(*From Our Regular Correspondent*)

The annual return regarding tramways and light railways and trackless trolley undertakings issued by the Local Government Board shows that since 1878 the route length of tramways and light railways on public roads open for traffic in the United Kingdom has increased from 269 to 2703 miles, the capital expenditure from £4,207,350 to £80,977,838, the number of passengers carried from 146,000,000 to 3,426,000,000, and the net receipts from £230,956 to £5,628,321. Of the total of 1848 miles of line owned by local authorities, 1640 miles are worked by those authorities themselves, or, in a few cases, by other local authorities leasing from them, and the remaining 208 miles by leasing companies. Last year the route mileage worked by electric traction was 2546 miles out of a total of 2662. This year it is 2595 miles out of 2703. Of the 279 undertakings, 171 belong to local authorities and 108 to companies or other parties. The net receipts of local authorities who work tramway undertakings belonging to them, or leased from other local authorities, amounted to £4,071,610. On the year's traffic £1,218,299 was required to pay interest or dividends on capital, and £120,039 for rent of leased lines. The sum of £1,371,263 was applied towards the reduction of tramway debt, and £589,886 for relief of rates, while £711,217 was carried to reserve and renewal funds. As regards the length of line open for public traffic, the London County Council system comes first with 146 1/6 miles, then Glasgow with 103¾ (including depot connections), while Manchester is credited with 78¾ and Liverpool with 64½. Among company undertakings the London United heads the list with 53¾ miles.

The Halifax Town Council has decided to promote a bill in Parliament giving it power to spend about £120,000 on new tramway works. It is proposed to extend the tramways from Brighouse to the Huddersfield border via Rastrick, from Halifax and Elland, from West Vale to Stainland, and from Triangle to Ripponden; to run trolley vehicles and motor buses and to secure extension of the periods during which the corporation will have possession of the tramways it has constructed in the areas of other local authorities. The Halifax Corporation is also seeking powers to run trail cars and to deal with road maintenance in connection with the running of motor buses. The clause regarding the buses follows what has now become standard practice, namely, the corporation will pay to the road authority during the first three years ⅜d. per car-mile run by the buses in the outside area. After three years, and at the end of every subsequent three years, the extra cost of road maintenance caused by the running of the buses is to be ascertained, of which the corporation will pay half, but in no case will this contribution exceed ⅜d. per car-mile run. Any grant made by the Imperial Exchequer is to be taken into account.

Mr. Pilcher, the manager of the Aberdeen Corporation Tramways, has issued a report to the members of the tramways committee to refute the criticisms on P. A. Y. E. cars. He states that the cars have been in operation on the Woodside route for twenty months, Beach route ten months, Torry route seven months, and Mannofield route four months—practically half the system now being operated. Generally speaking, he found that there was a considerable amount of criticism at first. From an administrative and operating point of view they have been an unqualified success. The number of accidents to persons attempting to board or alight from the ordinary cars while in motion, for twelve months ended Dec. 1, 1914, was 87, all of which platform accidents would either have been prevented or greatly minimized on P. A. Y. E. cars. Most of these occurred while the conductor was engaged inside or on top collecting fares. It very rarely happens that a serious platform accident occurs on a P. A. Y. E. car, as the conductor is always present to prevent it. It is interesting to note also that nearly all the conductors and motormen are in favor of the P. A. Y. E. cars.

For a considerable period the London County Council and the Stepney Borough Council have been at variance over the system on which the tramway between South Hackney and the Docks (by way of Grove Road and Burdett Road) should be electrified. The County Council wanted to install the overhead system; the Stepney Council insisted upon the conduit. The result has been that the old horse cars have ceased to run, and this important route is now without trams, though not without motor buses. Recently the need for reconstructing the tramway became urgent, and the County Council undertook to reconstruct the existing tramways for horse traction, but in such a way that they would be suitable for electrification at some future date, on the overhead trolley system. Against this the Stepney Council entered a protest. Now it has been asked by the Board of Trade if it has any further observations to offer on the plans furnished by the London County Council. At the same time, the board states that it is not prepared to withhold consent from the proposals of the County Council on the ground that that authority does not propose to renew the lines in such a way as to facilitate their equipment for electric traction on the overhead trolley system. The board transmitted copy of a communication from the Poplar Borough Council, showing that the Borough Councils of Poplar, Bethnal Green and Hackney have agreed to the overhead system and are anxious that the Stepney Council should withdraw its opposition. The works committee of the Stepney Borough Council has now replied to the Board of Trade that it has no further observations to offer except that it is doubtful whether any appurtenances purely germane to the overhead trolley system can be provided by the London County Council in the absence of the consent of the Borough Council. In other words, the deadlock continues.

The last of the horse tramways in London are shortly to be removed as the London County Council has sanctioned the expenditure of £22,000 for the widening of certain roads preparatory to electrifying the horse tramway at present running from Tower Bridge Road to Rotherhithe. The total cost of electrifying this route, which is about 27 miles in length, will be £74,700, apart from the cost of street widenings, the track work alone costing £62,500. The new tramways will be constructed on the conduit system, thus enabling through service in connection with the other routes linking up with both ends of this branch. The reconstruction of this route has been before the London County Council and the Bermondsey Borough Council for several years, the difficulty being that the London County Council favored the overhead system, while the Bermondsey authority refused to consider any other than the conduit system. After several interviews between representatives of the two bodies concerned, the London County Council yielded.

London is to have a second bill promoted in Parliament at the next session with a view to supplying electrical energy in an area comprising the Administrative County of London and adjacent areas. It will be in substitution for the London County Council bill, a few particulars of which were published last month. This second bill is promoted by a few of the London electric lighting companies, and the preamble states that electrical energy is now supplied to the County of London by a number of companies and local authorities, and that the existing conditions are unfavorable for the best economy. It states also that electrical energy can be supplied more effectively and economically from one combined undertaking, and that the existing undertakings in the area should be consolidated. The bill, therefore, proposes to incorporate a company with a share capital of £6,000,000 and a loan capital of £2,000,000 "for the purpose of consolidating, unifying and improving the generation and distribution of electrical energy for all purposes in the area of supply as defined by the act, and of utilizing to the best economical advantage all existing means of generation and distribution of electrical energy within the area, with a view to the ultimate provision within the area of one system of supply of electrical energy with concentrated generation and standardized distribution." The companies proposed to be transferred to the new statutory company are the Charing Cross, West End & City Electricity Supply Company, Ltd., the Brompton & Kensington Electricity Supply Company, Ltd., the Central Electric Supply Company, Ltd., the Chelsea Electricity Supply Company, Ltd., the Kensington & Knightsbridge Electric Lighting Company, Ltd., the London Electric Supply Corporation, Ltd., the Metropolitan Electric Supply Company, Ltd., the Notting Hill Electric Lighting Company, Ltd., the St. James & Pall Mall Electric Company, Ltd., and the Westminster Electric Supply Corporation, Ltd.

A. C. S.

News of Electric Railways

BUFFALO-NIAGARA FALLS LINE

Project Involving Expenditure of Several Million Dollars Approved by Commission

The Public Service Commission of the Second District of New York has granted the International Railway permission to build its proposed high-speed electric line between Buffalo and Niagara Falls over private right-of-way, and has authorized an issue of the company's 3 per cent fifty-year refunding and improvement mortgage bonds to the amount of $2,395,000, to be sold at not less than 87, netting a little more than $2,000,000 to pay for the new line.

The new line will start on Main Street, Buffalo, at the intersection with the Buffalo & Lockport line of the International Railway, and run northwesterly out of Buffalo to Tonawanda, through Tonawanda over the old Buffalo, Thousand Islands & Portland Railroad line, through North Tonawanda, the town of Wheatfield, village of La Salle and into the city of Niagara Falls to Portage Road and over Portage Road to Niagara Street.

Included in the cost of the new line is provision for the purchase of sixteen new 52-ft. steel underframe interurban cars, substations at Payne Avenue and Niagara Falls, a carhouse at Niagara Falls, stations at La Salle, Division Street and Tonawanda, waiting rooms at Main and Erie Streets and at Payne Avenue, and a shelter house at Ward's Road. It is provided that the new line shall cross the New York Central tracks by an overhead bridge, and bridges are provided for over Mill Creek, Ellicott Creek, State Ditch, Tonawanda Creek, Cayuga Creek, Gill Creek and the Gratwick Trestle.

The right-of-way and real estate are to cost $800,000, as detailed in the report of H. F. Riesinger; bridges and culverts, $240,500; substation equipment, $78,700; buildings, $109,850; rolling stock, $160,000; track line and grading, etc., $127,837.

PUBLIC SERVICE COMMISSION INQUIRY

New York Legislative Committee Begins Inquiry into Practices of First District Commission—Secretary Whitney Testifies

The taking of testimony by the legislative committee appointed to inquire into the workings of the Public Service Commissions of New York was begun in New York City on Jan. 30. Travis H. Whitney, secretary of the commission for the first district since its creation in 1907, explained the routine of the organization. Starting with 403 employees with salaries of $724,216 in 1907, the commission last year had 2097 employees, with salaries of $2,903,321 and expenses of $2,971,000. The increase was attributed to the building of the new subway system. The commission had twelve lawyers on its staff, but spent $57,825 for special counsel since 1907. Some of the questions were directed toward ascertaining the qualification for office of Joseph Johnson, head of the transit inspection bureau of the commission, former fire commissioner of New York and campaign manager for Judge McCall, chairman of the commission, when the latter ran for Mayor.

The history of the now famous wheel-guard case in connection with which William R. Willcox, former chairman of the commission, was held in contempt of court, was reviewed. Mr. Whitney said that the policy of the commission in regard to pressing suits to require compliance with its orders had been influenced very largely by the outcome of several of the early actions brought by the commission. In one of them the commission was awarded only $1 damages and it did not appeal, while in another action by the commission to compel respect for its orders the judge dismissed the complaint.

At the hearing on Feb. 1 it was brought out that correspondence in regard to informal complaints amounted to some twenty or thirty letters a day and that this was cared for by Mr. Whitney and George S. Daggett, the chief clerk. The complaints addressed to individual members of the commission went to such members. In the case of informal complaints no hearings were held and no orders issued. Citizens who made complaints usually wished to have them treated as informal ones, in order to obviate the necessity of having to testify at public hearings. Asked what supervision the commission exerted over this correspondence, Mr. Whitney said that Commissioner Woods, since taking office, had been applying to him for copies of complaints. Mr. Whitney said that it was the regular practice to hold conferences between the individual commissioners and officers of the public service corporations, but denied that informal complaints were often modified after such conferences.

Mr. Daggett, who followed Mr. Whitney on the stand, was asked if some of the commissioners had not been displeased with his letters to some of the public service companies, and if such displeasure had not been shown after the commissioners had consulted with officials of the companies. He replied that it might have been. Required by Mr. Haywood, counsel of the committee, to answer specifically, Mr. Daggett said, "On one or two occasions, yes."

Mr. Haywood expressed himself on Feb. 2 as being well satisfied with the progress so far made in connection with the investigation. He said, however, that if the committee was to conclude its labors by Feb. 17 it would not be possible to go thoroughly into all phases of the commission's work. Up to Feb. 2 no plans had been made for the investigation of the commission for the second district.

BRITISH TRAMWAYS AND THE WAR

General Managers of Manchester and Glasgow Companies Report Effect of War Upon Finances and Number of Employees

Mr. McElroy, the general manager of the Manchester Corporation Tramways, has submitted a report as to the effect of the war upon the finances of the department. Since the first four months of the war there has been a large decrease in the receipts, as compared with the previous year, and it is anticipated that at the end of the financial year the income will be £900,000, or £50,000 below the estimate. Notwithstanding the increased expenditure owing to allowances to the men who have joined the colors, and the engaging and training of a new staff, and the reduced revenue, Mr. McElroy considers that the tramways committee will, at the end of the year, be in a position to pay £100,000 in relief of the rates and place £50,000 to renewals, etc., fund, instead of the estimated £102,000. The report continues:

"The number of men from the tramways department who up to this date have joined the colors is about one in 200, and the amount now allowed to them or their dependents is at the rate of £44,876 per annum. Our men are still leaving us daily to enlist. In addition to supplying so many men from our own department, we have assisted in the general recruiting campaign in Manchester by displaying striking posters in the tramcars, which, we are told, have had a good effect. The department has made an energetic effort to raise funds by means of collections in the tramcars. The weekly collections since the commencement have amounted to £5,827. The various bills and posters which have been placed in the cars in connection with these collections have cost the department up to the present about £150, which equals 2½ per cent on the amount collected. Free riding on the tramcars has been granted to those recruits who have joined the city battalions and are not housed at the places where their training is taking place, and have therefore to travel daily to and from their homes. The free traveling facilities are provided by granting supplies of tokens to the commanding officers, who undertake to distribute the tokens and to see that the privilege is not abused. The value of the tokens distributed up to the present has been £2,057, which equals nearly 500,000 1d. fares."

A communication to the ELECTRIC RAILWAY JOURNAL from James Dalrymple, general manager Glasgow Corporation Tramways, states that the company is at the present time recruiting an additional 300 men as a reserve company for the tramway battalion, and later will probably be asked to

procure another 300. The men of the "First Glasgow" H. L. I., comfortably housed at Gailes, are now equipped and almost ready for the front. The company has prepared leaflets describing its troops and is having its female staff distribute these in the cars.

As to the new conductors, Mr. Dalrymple says that, although practically all new men with but very little training, they are doing quite well. The revenues of the company are showing a slight increase over last year. The fiscal year does not end until May 31, but if conditions continue as at present, the revenues should about equal those of last year.

RAPID TRANSIT IN CINCINNATI

Representatives of a number of civic organizations attended the meeting of the Rapid Transit Commission of Cincinnati at the Business Men's Club on Jan. 29. President Edwards of the commission explained the four plans presented by the engineers recently and then said that if the east and west sides of the loop in scheme No. 4 were built, all the interurban lines with one exception would have entrance to the business section of the city. He said that this line could be brought in over one of the surface tracks until the remainder of the loop is completed. The cost of constructing the two sections would be about $3,000,000 less than for the entire loop. A suggestion from another speaker that only one side of the loop be constructed at first met with disfavor.

The east side of the loop extends from the business district to Forest, while the west side extends to Crawford. The third side connects these two points and passes through Mitchell, St. Bernard, Paddock and Montgomery. Rapid transit service could not be furnished these places until the city is able to build the third section, if the plans suggested are carried out, but it was said at the meeting that they do not form a portion of the city and there is no obligation to furnish their residents with the new service at once.

W. W. Freeman, president of the Union Gas & Electric Company, sent a communication to the commission in which he stated that his company would do everything possible to aid in the improvement and that power might be furnished from its plants for the operation of the road on a more economical basis than if generated in stations built by the city. The commission promised to give this matter serious consideration.

Walter M. Schoenle, city solicitor, told the commission that he had prepared a bill for introduction in the Legislature that would, if passed, result in relinquishing the city from paying a rental of $32,000 a year for the use of the canal bed for the rapid transit line. The commission delayed any expression of opinion on the matter until the bill has received careful consideration.

INDIANA LEGISLATURE

The following bills have been introduced in the Indiana House: A bill providing that incorporated towns of 500 or more inhabitants may by order of the Town Board compel the stationing of flagmen or installation of signal systems at dangerous railroad or interurban crossings within the towns; a bill amending the tax laws to place the power of evaluating all public utilities in the hands of the State board of tax commissioners; a bill amending the old railroad commission act (now thrown under the Public Service Commission) providing that the commission shall have six months instead of thirty days to take action on railroad tariffs; a bill amending the present 2-cent fare law, and fixing the maximum fare at 2½ cents a mile.

In introducing the last measure, Mr. Waltz called the attention of the General Assembly to the fact that the Interstate Commerce Commission has recommended a 2½-cent rate in interstate business and that the various states enact laws to make such a rate legal within the confines of the several states.

The "anti-lobby" bill has passed the Indiana House, and has been amended and passed by the Senate. One of the Senate amendments provides that if any newspaper receives compensation for printing any article advocating or opposing any measure before the Legislature, it shall print the amount of the compensation received for such article and at whose instance it was printed. The amended bill has been approved and passed by the House, and will probably be signed by the Governor.

The nine-hour day bill, covering substation or switchboard operators who control or report train movements of electric railways, has been killed in the House.

SECURITY SELLING COMPANY UNDER INVESTIGATION

At the instance of the Interborough-Metropolitan Company, New York, N. Y., District Attorney Perkins has under investigation the Interborough-Metropolitan Investing & Security Company, which has recently been selling to Italian subway laborers for $24 a share Interborough-Metropolitan Company common stock quoted at $11 and $12 a share. The security selling company, which of course has no connection with the railway, induced the Italians to purchase these shares through advertising in Italian newspapers. The advertisement featured the great "opportunity" that accompanied the sale of the stock at $24, but carefully refrained from making any direct promises or statements that might give grounds to action for fraud. The railway has notified August Belmont & Company, transfer agents, not to transfer any of the stock to the Italian buyers and altogether about 300 shares of stock have been refused for transfer. It is reported that suit will be brought against the Interborough-Metropolitan Company by one of the New York Stock Exchange brokerage houses that have been dragged into the affair, to recover damages for the holding up of its stock transfers. The railway, however, in order to protect its Italian workers, is willing to allow the courts to decide the legality of its stand. The security selling company, which is said to be headed by Roberto Parodi, was formed to deal only in Interborough-Metropolitan stock and has been in existence for little more than two weeks. According to latest advices, Mr. Parodi has been arrested on the charge of grand larceny in the second degree.

BAY STATE ARBITRATION HEARINGS

Hearings by the Bay State Street Railway wages arbitration board were suspended during the week ended Jan. 30 on account of other engagements of counsel. At the later sessions various division superintendents located at important points north and south of Boston testified that the policy of the company was one of leniency toward mistakes of an unintentional character and that there was no difficulty in securing a plentiful supply of new men at the prevailing rate of wages. Representatives of the union admitted that in conferences last fall the company had offered to put into effect a daily guarantee of five hours' pay for all transportation employees, but that the offer was refused by the union, which desired a seven-hour guarantee. P. F. Sullivan, president of the company, also offered to increase the wages of blue uniformed men 0.5 cent an hour for two successive years, pointing out at the conferences that the company's finances would not justify a further advance. Extended testimony was offered by employees to the effect that the cost of living has risen materially in the last five years and that the present maximum of 28 cents an hour should be increased to 35 cents. The employees' union contends that new men should be paid 30 cents an hour and that at the end of the first year the maximum should be attained. The company's side of the case has not yet been presented. Prof. Irving Fisher of Yale University testified on behalf of the employees' union that the cost of living has risen about 50 per cent in the last eighteen years. The rise in prices is the resultant of five different factors: amount of money in circulation, amount of deposits subject to check, the velocity of circulation, activity of bank accounts and the volume of trade. Professor Fisher contended that $16 a week is the minimum wage upon which a family of five can subsist.

COUNCIL MEETINGS IN CLEVELAND

The plan to have the Cleveland (Ohio) Railway purchase the North Randall line at $146,000 was defeated at a meeting of the City Council on Feb. 1, although Peter Witt, street railway commissioner, favored the idea.

The street railway committee has presented an adverse report on Councilman Gahn's proposed ordinance requiring the Cleveland Railway to furnish derailer operators at all grade crossings.

In reply to an inquiry from Councilman Dittrick, on

Feb. 1, Mr. Witt said that the $2,500,000 which the company had agreed to expend in extensions and betterments under the Tayler agreement has been exhausted. Proposals for the expenditure of funds for this purpose must now be made by the company. Council has a right to veto the plans, however. The money has been used for the construction of division carhouses and buildings, track and rolling stock.

Virgil J. Terrill has undertaken to relieve certain cities of the necessity of seeking consents from the owners of property abutting on proposed street railway lines by introducing a bill in the Legislature making this unnecessary in cities that operate under a charter adopted in accordance with the State constitution. This is meant to apply to Cleveland and especially to open the way to building tracks on Euclid Avenue between East Twenty-second and Fortieth Streets, otherwise known as "Millionaires' Row." The city wants this section of road built the coming spring and summer.

The Council asked the company to operate its motor buses on East Thirtieth Street to test the need for a crosstown line at that point. The income from the bus operated on Noble Road at a 5-cent fare, for December, 1914, was 6.03 cents per car-mile, while the cost of operation was in excess of 20 cents, it is said. During the same month the bus on Pearl Road earned only 4.68 cents per car-mile, with the cost of operation about the same. These routes are outside the city limits.

TRACKLESS TROLLEY BILL IN PENNSYLVANIA

Representative Gans of Philadelphia has introduced a bill in the Legislature at Harrisburg that would overcome the objections of the Public Service Commission to granting charters to "trackless trolley" companies. Recently application was made to the commission for a certificate of public convenience by the Perkiomen Electric Transit Company, which proposed to run a trackless trolley through the Perkiomen Valley. The commission refused the application on the ground that under the general corporation act of 1874 no provision was made for the granting of charters for such a company, as noted in the Electric Railway Journal of Jan. 16. The bill of Mr. Gans amends the act of 1874 governing the incorporation of motorbus and omnibus lines by providing regulations for corporations drawing power from overhead wires. It is understood that the Perkiomen company, should the bill become a law, will apply again to the commission for a charter.

DETROIT PURCHASE NEGOTIATIONS

James Couzens, president of the Detroit street railway commission, announced in an interview in Detroit newspapers that negotiations for the purchase of the property of the Detroit United Railway within the one-fare zone would be undertaken shortly by the commission on the basis of the appraisal of $21,000,000 made for the commission by Prof. E. W. Bemis. He intimated that the city had a club to force a reasonable price in the 3-cent fare ordinance which was dropped at the time the day-to-day agreement establishing seven-for-a-quarter tickets was reached. He also stated that if the people rejected the price as agreed upon by the commission and the company the commission would then know whether the electors wanted municipal ownership and what plan to follow thereafter. Professor Bemis, in his supplementary report to the commission, fixed the franchise values of the Detroit city lines at approximately $2,500,000, making the total appraisal about $21,000,000 up to July 1, 1914. Prof. David Friday, of the University of Michigan, who appraised the franchises for the company, set the value at $7,500,000.

CLEVELAND FARE MATTER

Members of the Council of Cleveland, Ohio, are threatening the Cleveland Railway with an invasion of auto bus service. Interviews with Councilman William Stolte have appeared in the local papers suggesting bus operation. Councilmen W. J. Reynolds and J. J. McGinty, however, have seconded his ideas to a large extent. They will try to have the company operate its three auto buses on East Thirtieth Street, where the next crosstown line is to be built, and test the extent to which a bus service can compete with the electric railway. These vehicles are now in operation on Noble Road.

Councilman Dittrick in an interview on Jan. 28 stated that the amount paid out in accident claims will never be less so long as the cars are speeded up and the present schedules are maintained. He believes that people will have to be satisfied with a few minutes added to the running time of the cars if they wish to retain the low fare.

Several councilmen favor the plan of J. J. Stanley, president of the company, extending the Prospect Avenue line from Fortieth Street to Fifty-fifth Street and linking up one of the West Side lines with it, in order to relieve the congestion at the Public Square by running cars through. Within a short time it is thought that the Euclid line will run through on Euclid and not around on Prospect, as at present.

Bill in Kansas Legislature.—A bill has been introduced in the Kansas Senate providing that at all railway crossings in Kansas where a hedge fence approaches the crossing the fence must be kept cut down to a height not exceeding 5 ft. for a distance of eight rods from the highway.

Local Control of Milwaukee Utilities.—By a vote of twenty-five to eleven, the Common Council of Milwaukee on Jan. 18 approved a bill to be presented to the State Legislature asking that the Wisconsin Railroad Commission be relieved of all jurisdiction over the public utilities in Milwaukee, and that the control of these utilities be placed within the jurisdiction of the Council.

Legislation on Working Conditions.—A bill has been introduced in the Ohio House which will require that street and interurban railways have motormen and conductors instructed in their work for fifteen days prior to taking charge of cars; that nine hours shall constitute a work day, which is to be completed within eleven hours, and that motormen and conductors shall have thirteen consecutive hours of rest.

Saskatoon Railway Results.—The City Council of Saskatoon, Sask., on Jan. 7, in passing the street railway estimates for this year, desired to have the commissioners bring in a detailed report on the public utilities, of which the municipal railway shows a loss. A telegraphic dispatch from Saskatoon states that notice of a motion has been given for an early meeting of the Council, to consider the sale of the municipal railway.

Report on Montreal Franchises.—The Board of Control of Montreal, Que., on Jan. 4, in accordance with a resolution passed on Dec. 30, began a systematic study of the Montreal Tramway's twenty-three separate franchises, granted by the various municipalities now forming the city of Montreal, and the numerous engineering and statistical reports on the system. At the discussion on Jan. 9, the city attorney was asked for an opinion as to the various franchises, the rights comprised in them, etc.

Passaic Gas Rate Case Reopened.—The New Jersey Court of Errors and Appeals on Jan. 27 granted a rehearing of the Passaic 90-cent gas rate case. This court, as noted in the Electric Railway Journal of Dec. 19, page 1331, reversed the decision of the Public Utilities Commission reducing the gas rate to 90 cents, on the ground that the franchise values of the gas subsidiary of the Public Service Corporation of New Jersey had not been considered in determining the basis for a fair return. No date has yet been set for the rehearing.

Brooklyn Rapid Transit Assessment Lowered.—The assessments made by the State Tax Commissioners against the Brooklyn Rapid Transit System for the 1915 special franchise tax have been lowered $3,000,000. In 1913 the component companies were assessed at sums aggregating $47,130,835, this amount being voluntarily cut by the State Board of Equalization in 1914 to $34,356,263. Corporation Counsel Polk has protested against the cut on the ground that the cost of pavement should be included in the cost of reproducing the tangible property in the streets.

Legislation in Tennessee.—Three measures of much importance to the electric railways of Tennessee have just been introduced in the State Legislature. One would give

city railways the right to acquire and operate interurban lines. Another would make it unlawful for passengers to sell or give away transfers and provide penalties for violation of the law, while the third would require that all damage suits to persons or property be tried in counties where the accidents out of which they grew occurred, except when service of process may not be had in such counties.

Delay on New York Subway.—Drippings of water and collections of dust from an opening near the Seventy-second Street station of the New York subway caused a short-circuit on the third-rail on one of the uptown express tracks near that point on the morning of Feb. 2. The matter would have been remedied in about ten minutes by the switching of the uptown express trains to the uptown local tracks and the removal of the defective insulator by a repair gang, but someone rang a fire alarm signal and the fire department insisted upon stopping all traffic and making the passengers leave all trains while it investigated the trouble. The result was a delay of an hour or more during the height of the rush-hour traffic.

Ontario Hydro-Electric Railways.—The question of building an electric railway from the Niagara frontier, via Hamilton, to the Georgian Bay, is under consideration of the Hydro-Electric Power Commission of Ontario. Comptroller Morris, Hamilton, stated on Jan. 4 that F. A. Gaby, chief engineer of the commission, had shown him plans for a line from Queenston and Dunnville, through Hamilton, to Georgian Bay, and that the surveys had been completed for this and connecting lines from Dunnville to Beamsville, from Queenston to Beamsville, and from Guelph to Toronto; that preliminary surveys had been made on other sections of the district to be served, and that the surveys would be resumed almost immediately. The construction of the line would depend entirely on the action Hamilton was prepared to take.

Bills Introduced into the New York Legislature.—The following measures have recently been introduced into the Legislature of New York: To amend the public service commission law, in relation to the free transportation of chiefs of police of the municipalities of the State; to amend the code of criminal procedure, in relation to the payment of expenses and prosecution of crimes committed on railway trains; to amend the railroad law, in relation to the names of railroad stations; to make an appropriation for the elimination of certain grade crossings; to validate the consolidation of the Susquehanna Valley Electric Traction Company as a New York State corporation, with the Waverly, Sayre & Athens Electric Traction Company, a Pennsylvania corporation, by which the Waverly, Sayre & Athens Traction Company was formed; to amend the workmen's compensation law in relation to abolishing self-insurance.

Disposition of Chicago's Traction Fund Explained.—Mayor Harrison of Chicago has issued a statement in reply to numerous criticisms regarding the loose handling of the $14,000,000 traction fund. More than $2,500,000 of the fund is kept in Chicago banks. The records of authorization for distributing the remainder, filed in the city comptroller's office, show that the city has been taking out cash for the last four years by substituting tax anticipation warrants. These warrants are said to be a first lien against the city's taxes, being retired as rapidly as taxes are received. They are permitted to be issued in an amount equal to only 75 per cent of the total of the city's share in the taxes. For the amount loaned the city has been paying the banking rate of 3 per cent. The City Council has taken no action on the Mayor's proposal to contribute a portion of the fund to a pension fund for railway employees. It was assailed by the employees' association as a subterfuge for securing votes.

Merger Measure in Washington.—Ben Johnson, chairman of the district committee of the House, has referred to the District Commissioners the Page bill, which would authorize connecting or intersecting street railways of the District of Columbia to be operated under joint management. The district committee will take no action on the bill until the commissioners have handed in their recommendations. The Page bill, in short, authorizes any street railway in the District to acquire, by lease or purchase, connecting or intersecting lines, provided the holders of a majority of the stock of the two lines vote for consolidation or joint management. It is stipulated, however, that lines which so consolidate shall charge only a single fare for a continuous ride within the District over all of the lines affected by the consolidation. It is also stipulated that the aggregate capital stock of the purchasing company shall not exceed the combined capital stocks of the contracting companies.

Massachusetts Legislation.—Among the measures introduced into the Massachusetts Legislature is a bill providing that the rate of fare on street railways transporting passengers from one town to another shall not exceed 5 cents where the distance involved is not more than 5 miles. The bill is particularly aimed at the 6-cent fare unit established on the Middlesex & Boston Street Railway by recent decision of the Public Service Commission and also seeks to restrict interurban fares to the 1-cent per mile basis indicated above, within the 5-mile limit. A bill has been introduced into the House establishing a 2.5-cent fare by rebate check for passengers unable to obtain seats on street cars, and another bill provides that all street railways shall equip their cars with steps not more than 8 in. above the ground and with a maximum rise of 7 in. on steps leading to the car platform from the lowest tread. A bill is also before the House requiring all street railways to meet the expense of oiling sections of the public highways covered by their franchises, where the rest of the traveled way has already been oiled by the local authorities.

Suits Against Chicago Railways for Ordinance Violations.—In accordance with the general policy recently adopted by the Chicago city administration of entering suits against railways for violation of city ordinances, more than 100 suits have been begun in the Municipal Court on account of the failure to post copies of the traction ordinances in the cars. Another suit involves the right of passengers to demand and receive transfers at all intersecting points, some of which were specifically excluded by provisions in the 1913 merger ordinance. Still other suits charge the Chicago City Railway with posting only one copy of transfer regulations in the cars instead of two, as required by the ordinance. Action on suits previously brought has resulted in the fact that the Surface Lines have been fined in the Municipal Court for violating the ordinances requiring signs on cars clearly to designate both the route and destination. The company was fined $25 in each of sixty cases. Twenty-one more sign cases have just been submitted to the court and a fine of $50 each was assessed for violating the city ordinance.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

The program for the annual meeting of the Central Electric Railway Association, to be held at the Hotel Severn, Indianapolis, Ind., on Feb. 25 and 26, will include addresses by Samuel Ralston, Governor of Indiana; Judge Thomas Duncan, chairman of the Indiana Public Service Commission; C. Loomis Allen, president of the American Electric Railway Association, and C. E. Peirce, vice-president of the Manufacturers' Association.

A. I. E. E. Mid-Winter Convention

The third New York mid-winter convention of the American Institute of Electrical Engineers will be held at institute headquarters, in New York, on Feb. 17, 18 and 19. The program will be of a general nature. Two sessions will be under the auspices of the transmission committee; one of these will be devoted to the discussion of impact testing of high-tension insulators; the other to miscellaneous subjects connected with high tension work. Another session will be devoted to papers provided by the electrophysics, electric lighting and mining committees. The last technical session of the convention will be devoted to the subject of application of electric motors, and a number of prepared discussions will be presented giving the characteristics of each type of motor which govern its application to various kinds of work. The session on the evening of Feb. 17 will include addresses by a number of prominent engineers on the general subject of the status of the engineer. On the evening of Feb. 18 a dinner-dance will be held at the Hotel Astor. The afternoon of Feb. 19 will be devoted to inspection trips to points of engineering interest.

Financial and Corporate

BANK HOLDINGS OF PUBLIC UTILITY BONDS

According to the report of the Comptroller of the Currency for the year ended June 30, 1914, the holdings of public utility bonds by the 26,765 banks of all kinds in the United States on that date were less by $137,500,000 than on the corresponding date in 1913. At the same time holdings of railroad bonds by these banks increased $145,100,000.

This decrease in public utility holdings and increase in holdings of railroad bonds were caused by changes in the investments of trust companies and savings banks. The national banks took the opposite course in increasing their holdings of public utility bonds and decreasing their holdings of railroad bonds.

The holdings of these classes of bonds over a three-year period are as follows:

	1914	1913	1912
Public Utility Bonds			
National banks	$218,200,000	$197,400,000	$195,700,000
Trust companies	224,700,000	334,300,000	208,700,000
State banks	50,800,000	52,900,000	53,600,000
Savings banks	88,500,000	135,300,000	143,500,000
	$583,900,000	$721,400,000	$603,500,000
Railroad Bonds			
National banks	$341,700,000	$345,200,000	$384,300,000
Trust companies	395,300,000	297,200,000	380,200,000
State banks	76,600,000	65,500,000	71,500,000
Savings banks	859,600,000	821,500,000	794,100,000
	$1,675,300,000	$1,530,200,000	$1,631,600,000

The 7525 national banks reporting, increased their holdings of public utility bonds $20,800,000 in the period from June, 1913, to July, 1914, while at the same time their investments in railroad bonds decreased $3,500,000. The 1564 trust companies in this period increased their investments in railroad bonds by $98,100,000 and decreased their holdings of public utility bonds by $109,600,000. The 14,512 state banks decreased their public utility holdings by $2,100,000 and increased their investment in railroad bonds by $11,100,000. The 2100 mutual and stock savings banks increased their investments in railroad bonds by $38,100,000 and decreased their public utility bond holdings by $46,800,000.

The aggregate amount of holdings by all banks on June 30, 1914, was $5,584,900,000, of which 10.43 per cent was in public utility bonds. The proportion of public utility bonds to the total holdings by each class of banks was as follows: State banks, 13.70 per cent; mutual savings banks, 4.50 per cent; stock savings banks, 0.427 per cent; private banks, 10.43 per cent; trust companies, 17.82 per cent; national banks, 11.40 per cent.

CAPITALIZATION REPORT OF NEW YORK COMMISSION

The division of capitalization of the Public Service Commission for the Second District of New York reports that the net amount of new securities authorized during the calendar year 1914 was $178,722,277. Since 1907 the commission has authorized nearly a billion dollars' worth of securities. A large part of the increase in 1914 was probably due to refunding operations and a number of purchases where securities were merely exchanged. During the year only ninety-four applications were made for authority to issue new securities, as compared to 126 in 1913 and 111 in 1912. For the first time since it was created, the division began the new year with practically a clean slate. Commenting on the acquisition of one property by another, H. C. Hopson, chief of the division, says that in many cases the purchasing corporation is obliged to pay a price in excess of the original cost of the physical property acquired. The commission allows the increased purchase price but insists upon its amortization over a reasonable number of years. This practice results in a conservative statement of the property accounts of the acquiring company, and at the same time makes it possible to put into effect immediately the savings resulting from the cutting down of competition and the instituting of centralized management. Mr. Hopson also emphasizes the fact that corporations should take better care of the filing of their vouchers and also make better explanations for entries in their capital accounts.

ANNUAL REPORT

Lehigh Valley Transit Company

The statement of income, profit and loss of the Lehigh Valley Transit Company, Allentown, Pa., for the year ended Nov. 30, 1914, follows:

Operating revenues:	
Revenue from transportation:	
Passenger revenue	$1,446,694
Other transportation revenue	78,075
Total	$1,524,769
Revenue from other railway operations: Power sales, etc.	344,236
Total operating revenue	$1,869,005
Operating expenses	1,052,693
Net operating revenue	$816,312
Taxes	97,961
Operating income	$718,351
Non-operating income:	
Dividend income	$107,963
Interest on notes, bank balances, etc.	14,985
Total	$122,948
Gross income	$841,299
Deductions from gross income:	
Interest on funded debt	$530,894
Rent for leased roads	53,341
Interest on unfunded debt	17,915
Amortization of discount on funded debt	20,432
Miscellaneous debits: Legal expenses, etc.	10,596
Total	$633,178
Net income	$208,121

In spite of the widespread business depression and the unusually severe winter, the gross earnings of the company increased slightly more than 1 per cent during the year. The report states that the company maintained its property at its usual standard and also continued to carry out its original program of improvements. An amount of 22 per cent of the gross earnings was allowed for maintenance and depreciation. The company now operates 167 miles of railway, of which 146.38 miles are owned and 20.62 miles are leased. Its rolling stock consists of 113 closed cars, forty-one open cars, eleven freight cars and thirty service cars, making a total of 195 cars.

During the year the company acquired all the outstanding stock of the Easton Consolidated Electric Company. This company, in addition to the ownership of the Edison Illuminating Company of Easton, owns and controls 54 miles of railway from Easton to the Bethlehem district. It is stated that the through service established between Easton and Allentown has produced a large increase in the receipts of this line over the previous year, to the profit of both companies. The surplus earnings of the controlled company for the year ended Dec. 31, 1914 (December estimated), were stated to be $87,163. The interest charges on the collateral trust bonds now outstanding amount to $55,446, thus leaving a profit of $51,717 for the Lehigh Valley Transit Company on its investment.

In regard to its freight and express service, the report says that an efficient service of this character is operated from all points on the Lehigh Valley Transit Company to Philadelphia in connection with the freight department of the Philadelphia Rapid Transit Company. Arrangements were completed to include the Lansdale-Morristown territory on Jan. 2, 1915. The company rents a portion of the new transfer station erected by the Philadelphia Rapid Transit Company at Chestnut Hill, the transfer point. During the year the surplus from the freight department increased 25 per cent in the face of the prevailing adverse business conditions. Moreover, the surplus from the Adams Express Company business was 80 per cent more than during the previous year.

In summarizing the year's work, special attention was called to new track in Allentown, on the Bethlehem Pike, and in New Jersey; the installation of automatic signals on the Slatington Division; the removal of dangerous curves and steep grades; the building of new equipment in the company's shops; the purchase of nine new prepayment cars and the increased patronage of the company's high-speed limited service.

AMERICAN CITIES COMPANY PROSPECTS

Member of Visiting Board of Directors Describes Conditions Existing in Company's Subsidiaries

The board of directors of the American Cities Company, New York, recently made a week's tour of the properties of the constituent companies at Houston, Tex.; Little Rock, Ark.; Memphis, Tenn.; Knoxville, Tenn., and Birmingham, Ala. One of the directors, Frank B. Hayne, New Orleans, in describing the unanimous conclusions of the board, states that a thorough inspection was made of all the properties, including power houses, car shops, trackage and gas works, and the physical property of each subsidiary was found to be modern, up to date and competently handled. The properties are fully rounded out to serve each community adequately, and the existing facilities are in advance of requirements. The important question now is to develop fully the available business for which the systems have been so adequately equipped.

Continuing, Mr. Hayne says:

"A most gratifying spirit of co-operation on the part of the citizens was exhibited toward the public utilities in each city visited. It was very pleasing to hear one Mayor refer to the American Cities Company as the greatest factor in helping to build up his city. In each city we were met by representative men who spent the full day not only in going around the properties with us, but also in explaining the advantages and constant development of their cities. It was most encouraging to note the progressive development of these communities, and to know of the enthusiasm of each with respect to its future growth.

"Of equal weight with this spirit of co-operation was the outspoken recognition on the part of the leading citizens that the encouragement of outside capital was of the highest importance, that the most successful way to draw additional outside capital to their cities was through a broad distribution of the local company's securities, placed in the hands of satisfied investors, and that to attack outside capital invested in their cities was the most certain way to deprive their communities of additional outside funds. This attitude toward the investment of capital in public utility companies is most encouraging."

THIRD AVENUE DIVIDEND RECOMMENDED

After Investigation, Stockholders' Committee Asks for Quarterly Dividend of 1 Per Cent

The committee of stockholders of the Third Avenue Railway, New York, N. Y., appointed by President Frederick W. Whitridge at the last annual meeting to investigate the affairs of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 21, 1914, submitted a report on Feb. 1, in which it recommended that a quarterly dividend of 1 per cent be declared shortly after the beginning of the next fiscal year, to be paid not later than Oct. 1, 1915. The committee stated that with dividends paid at such a rate, there was no reason why the assets of the company should not continue to increase, why the conservative management of the company should suffer interference, or why the company should not be able to keep up its budget requirements besides adding to its surplus.

In reaching its conclusions, the committee said: "The special reserve for depreciation and contingencies from the statement ended June 30, 1914, has reached a total amount of $1,152,750. This amount was clearly a part of the net earnings of the property and should be considered as a part of the surplus earned since the company's organization, Jan. 1, 1912, which would increase the net income from $2,050,173 to $3,202,923. In 1914 the surplus earnings were $626,306 plus the reserve created for depreciation and contingencies, or $511,250—total, $1,137,556. These figures show that the net earnings of the company for 1914 were the equivalent of approximately 8 per cent on the stock, exclusive of the high maintenance charges, which were themselves a very liberal offset against depreciation."

The report gave the present management a clean bill of health and found that the physical property of the company is in commendable condition. In regard to the control exercised by the board of directors, however, the committee reported as follows:

"The records show that the company's directors, collectively, have at no time owned more than 113 shares of the total outstanding stock. The directorate is justly criticised as representing the bondholders and not the stockholders. A more general representation of the latter's interests is desirable as a matter of propriety as well as public policy."

The committee also stated that the annual report of the company should be in the hands of stockholders thirty days before the annual meeting. In a letter to the board of directors, President Whitridge agrees to this recommendation, but he states that the committee is in error in considering the depreciation reserve as earnings. Regarding the representative character of the board, he says:

"The committee is mistaken in supposing that the present board represents only 113 shares of stock. One director is the representative of a company which has 6025 shares of stock in its name, and two directors are members of firms which at the time of the stockholders' meeting held 2722 shares and 2015 shares, respectively. Besides this, I believe that the present directors represent many thousands of shares in addition."

British Columbia Electric Railway, Ltd., Vancouver, B. C.—It is announced that a dividend of 5 per cent per year has been declared on the preferred ordinary stock of the British Columbia Electric Railway for the half year, payable on Feb. 1. Last year a dividend of 6 per cent was paid.

Brooklyn (N. Y.) Rapid Transit Company.—In regard to the gross and net earnings of the Brooklyn Rapid Transit Company, which are published in this issue in the Table of Monthly Earnings, the company says that the abnormal gain in the operating revenue over the six months in 1913, $972,225, or 7.69 per cent, was caused by the operation this year of a part of the system of lines of the Coney Island & Brooklyn Railroad. The large increase in operating expenses, $801,834, was caused by the same factor. The decrease in fixed charges, $117,567, was brought about by the conversion of refunding 4 per cent bonds into preferred stock. At the recent annual meeting of the company, Eugene N. Foss, Boston, was added to the board of directors to fill the vacancy caused by the resignation of George F. Porter. At the present time the company has 8406 stockholders, compared to 6319 on June 9, 1914, and 3709 on June 9, 1913.

Chicago City & Connecting Railways, Chicago, Ill.—The financial statement of the Chicago City & Connecting Railways, formed as a collateral trust in 1910 to hold securities of the Chicago City Railway and various connecting railways serving outlying districts, shows that the gross income for the year ended Dec. 31, 1914, was $2,052,026, consisting of $1,964,771 from dividends and $87,255 from interest. Disbursements during the year required the following sums: Bond interest, $1,100,000; general expense, $45,081, and interest on bills payable, $16,033, a total of $1,161,114. The net income, therefore, was $890,912, which after a deduction of $875,000 for dividends on participation shares gave a surplus of $15,912.

Cleveland, Youngstown & Eastern Railway, Cleveland, Ohio.—On Jan. 30 Judge Pearson of the Cuyahoga County Common Pleas Court gave the Citizens' Savings & Trust Company, trustee for the bondholders, a judgment for $53,560 against the Cleveland, Youngstown & Eastern Railway on mortgages covering the portion of its line in Geauga and Portage Counties. Receiver Robert Beatty, whose appointment was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 2, was ordered to sell that portion of the property within ten days, unless the mortgage is satisfied within the period. Bondholders charge that the line has been allowed to deteriorate.

Columbus Railway, Power & Light Company, Columbus, Ohio.—The stockholders of the Columbus Railway, Power & Light Company on Jan. 26 approved the proposition to purchase the Columbus Light, Heat & Power Company. Previous references to this purchase were made in the ELECTRIC RAILWAY JOURNAL of Nov. 7, Nov. 14, and Nov. 28, 1914, and Jan. 9 and Jan. 23, 1915.

Electric Bond & Share Company, New York, N. Y.—The directors of the Electric Bond & Share Company have called a special meeting of stockholders on Feb. 17 after the regular annual meeting for the purpose of authorizing an increase in the company's capitalization from $10,000,000 to $16,000,000 through adding $3,000,000 of 6 per cent preferred stock and $3,000,000 of common stock.

Gary & Interurban Railroad, Gary, Ind.—It has just been announced that the payment of coupons due on Sept. 1, 1914, on the $350,000 of 6 per cent convertible notes of the Gary & Interurban Railroad, which payment was for a time deferred, was made on Nov. 29, 1914.

Long Island Railroad, New York, N. Y.—Dick Brothers & Company, New York, are asking for proxies to be used at the annual meeting of the Long Island Railroad on April 13. It is asserted by the bankers that during the fourteen years when the Pennsylvania Railroad has operated this property the debts have increased more than $50,000,000, and the net earnings have been reduced from a substantial surplus to a deficit in 1915 of almost $1,000,000. According to a statement issued by President Ralph Peters, the Pennsylvania Railroad acquired its interest in the stock of the Long Island Railroad in 1901. At that time the Long Island Railroad was not paying dividends and had not paid any for five years. The property needed rehabilitation to eliminate grade crossings and electrify its road. This work, which is approaching completion, has involved an outlay of about $50,000,000, and has been accomplished largely through the co-operation of the Pennsylvania Railroad and by the use of that company's credit, without any assistance from the other stockholders. Mr. Peters mentioned several improvements which have been to the advantage of the Long Island Railroad, but which have been paid for by the Pennsylvania Railroad. In his opinion the charges made for the use of the Pennsylvania Terminal and the East River Tunnels are moderate, and the result through their aid has been a large increase in passenger traffic.

Mexico Tramways, Mexico City, Mexico.—It is reported that the Mexico Tramways has deferred the interest due on Jan. 1 on $6,083,333 of 6 per cent mortgage second issue bonds. The company has interest due on March 1 on $10,298,000 of first consolidated bonds, and it is probable this will also be defaulted, as conditions in Mexico are not improving.

Michigan Railway, Kalamazoo, Mich.—E. W. Clark & Company, Philadelphia, are offering to yield about 6.5 per cent the unsold portion of an issue of $5,000,000 of first lien 6 per cent five-year gold notes of the Michigan Railway. The notes are dated June 1, 1914, and mature on June 1, 1919. The payment of principal and interest is guaranteed by the controlling company, the Commonwealth Power, Railway & Light Company. A full description of this issue was given in the ELECTRIC RAILWAY JOURNAL of June 27, 1914, in connection with the original offer of the notes.

Monterey & Pacific Grove Railway, Monterey, Cal.—At a recent meeting of the bondholders of the Monterey & Pacific Grove Railway, a protective committee, consisting of Carver Pomeroy, W. F. Williamson and R. H. Cross, was appointed. The interest default on the first mortgage 6 per cent bonds of this company was noted in the ELECTRIC RAILWAY JOURNAL of Jan 23. "Jitney" bus competition was stated to be the cause of the default. This company is controlled by the Coast Valleys Gas & Electric Company, a subsidiary of the California Railway & Power Company.

New England Investment & Security Company, Springfield, Mass—The *Boston News Bureau* of Jan. 27 says: "On April 1 the $13,709,000 of New England Investment & Security Company debentures would, under their indenture, be entitled to a 2 per cent interest payment, or one-half of 1 per cent more than the semi-annual rate during the first five years of their fifteen-year term. According to the last New Haven report, these debentures were owned by the New England Navigation Company and carried by it at a book value of almost par, although appraised at only $9,000,000 as collateral behind the $20,000,000 of short-term notes of the New England Navigation Company. An understanding has recently been reached with the New Haven interests by which the latter will on April 1 receive but 1 per cent on these notes and be afterwards allotted the full interest rate only if earned. Without such a reduction in charges, the income of the New England Investment Company for the last six months would have been considerably short of the 2 per cent semi-annual disbursement made on Jan. 1 on its 40,000 preferred shares. Holders of about 34,000 shares of preferred stock who last autumn contributed $10 per share toward the purchase of the company's 1000 shares of common stock, are likely to receive back from the protective committee which has closed that transaction not far from $1.75 per share. This means that Sanderson & Porter received about $275,000 for the common stock, as compared to the $200,000 which they paid for it."

New York State Railways, Rochester, N. Y.—Harris, Forbes & Company, New York; N. W. Harris & Company, Inc., Boston, and the Harris Trust & Savings Bank, Chicago, are offering for sale fifty-year first consolidated mortgage 4½ per cent gold bonds of the New York State Railways. These bonds are dated 1912 and due Nov. 1, 1962, but are callable at 105 and interest on any interest date. The purchase of these bonds through J. P. Morgan & Company for a banking syndicate was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 30. An amount of $6,925,000 of this issue is already listed on the New York Stock Exchange, and application will be made to list the remainder.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The committee appointed on Dec. 11 by the security holders of the Oakland, Antioch & Eastern Railway to look into the affairs of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 19, has reported unfavorably upon the plan of the management for the financing of the company during the next three years. The main finding of the committee is that the plan is unfair to the bondholders, in that it would increase the liabilities of the company by creating new debts through the issuance of new notes and the pledging of new bonds. After the report was submitted the security holders authorized the appointment of a new committee of seven members, three to be appointed by the security holders, three by the directors and the seventh member by the two foregoing groups. It is reported that the time for the payment of the assessment of $1.50 per share on the stock of this company and of $3 per share on the stock of the Oakland & Antioch Railway, called for Jan. 15, has been extended to Feb. 13.

Ohio Traction Company, Cincinnati, Ohio.—On Jan. 25 the Ohio Public Utilities Commission authorized the Ohio Traction Company to issue $1,500,000 of 6 per cent gold coupon notes to be sold for the highest price obtainable but for not less than 95. These notes mature as follows: Sept. 1, 1916, $200,000; Sept. 1, 1917, and Sept. 1, 1918, $300,000, and Sept. 1, 1919, and Sept. 1, 1920, $350,000. This issue has been authorized to take the place of $750,000 of 5 per cent preferred stock authorized in 1912 to be sold at 90, and $300,000 authorized in 1913, which the company has been unable to market on the terms prescribed by the commission. The proceeds from this note issue, just as in the original authorization of the stock, are to be used to reimburse the company for expenditures made on capital account.

Quebec Railway, Light, Heat & Power Company, Quebec, Can.—The Quebec-Jacques Cartier Electric Company, a subsidiary of the Quebec Railway, Light, Heat & Power Company, has defaulted interest on its first mortgage 5 per cent bonds due on Dec. 1, 1914, and a protective committee has been formed with the Bankers Trust Company, New York, as depository. It is reported that the subsidiary is simply taking advantage of the ninety-day period of grace allowed by the indenture and that arrangements will be made by March 1, when foreclosure proceedings would be possible, to pay the interest.

Republic Railway & Light Company, New York, N. Y.—White, Weld & Company and Montgomery, Clothier & Tyler, both of New York, are offering for sale at 98¾ and interest, to yield 6¼ per cent, 5 per cent secured gold notes of the Republic Railway & Light Company, dated April 1, 1912, and due on Jan. 1, 1916. These notes are redeemable at 100 and interest at thirty days' notice. They are secured by deposit with the trustee of 98.5 per cent of the stock of

the Mahoning & Shenango Railway & Light Company, and are also a first lien, through deposit of first mortgage bonds, on new power house and other physical property costing more than $1,720,000.

San Francisco-Oakland Terminal Railways, San Francisco, Cal.—The California Railroad Commission has issued a notice to the effect that it will conduct on its own initiative an investigation as to the value of the property of the San Francisco-Oakland Terminal Railways. A public hearing in the matter has been set for Feb. 23 in San Francisco before Commissioner Phelen.

Twin City Rapid Transit Company, Minneapolis, Minn.—Donald Goodrich, who is a son of C. G. Goodrich, president Twin City Rapid Transit Company, has been elected a director to succeed Sir Henry M. Pellatt. It is reported that a proposition to reduce the membership of the board from twelve to eleven will be taken under consideration at a later date.

United Light & Railways Company, Grand Rapids, Mich.—N. W. Halsey & Company, New York, are placing on a 6¾ per cent basis $1,500,000 of 6 per cent gold coupon notes of the United Light & Railways Company. These notes are dated Jan. 1, 1915, and are due Jan. 1, 1918, and Jan. 1, 1920, but are callable, all or in part, upon four weeks' notice at 100 and interest and 101 and interest, respectively. The proceeds of these notes will be used to complete payments on property heretofore acquired and to reimburse the treasury for improvements to subsidiary properties. The notes will be secured by deposit with the New York Trust Company, as trustee, of $2,000,000 of first and refunding mortgage 5 per cent bonds, due in 1932. The authorized note issue is $3,000,000, but in addition to the present $1,500,000, more notes may be issued only as additional bonds are pledged and only in an amount not to exceed 75 per cent of their par value.

DIVIDENDS DECLARED

Boston (Mass.) Elevated Railway, quarterly, 1½ per cent.

Illinois Traction System, Peoria, Ill., quarterly, 3 per cent, common.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Ohio Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Dec.,		'14	$467,973				
1 "	"	'13	462,149				
6 "	"	'14	2,866,770				
6 "	"	'13	2,872,839				

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

1m., Dec.,		'14	$23,722	*$22,873	$849		
1 "	"	'13	24,608	*21,377	3,231		

BROOKLYN (N. Y.) RAPID TRANSIT COMPANY

6m., Dec.,		'14	$13,607,760	$7,521,934	$6,085,826	$2,350,593	†$3,096,993
6 "	"	'13	12,635,535	6,720,100	5,915,435	2,733,794	†2,733,793

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO.

1m., Dec.,		'14	$96,900	$62,470	$34,430	$30,791	$3,639
1 "	"	'13	105,365	62,807	42,557	33,087	9,470
12 "	"	'14	1,255,283	757,020	498,262	386,725	111,537
12 "	"	'13	1,255,235	759,387	495,848	381,930	133,918

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Dec.,		'14	$3,000,365	$1,365,197	$1,635,168	$913,036	‡$776,416
1 "	"	'13	3,035,729	1,332,748	1,702,981	913,149	‡843,904
6 "	"	'14	16,270,705	7,404,178	8,866,527	7,209,819	‡3,689,954
6 "	"	'13	15,999,453	8,866,527	7,132,926	7,209,819	‡3,272,574

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

12m., Dec.,		'14	$968,389	$415,724	$552,665	$308,642	$244,023
12 "	"	'13	960,262	346,712	613,549	298,048	315,501

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m., Dec.,		'14	$2,074,523	$1,202,654	$871,869	$807,016	$64,853
1 "	"	'13	2,141,522	1,248,860	892,662	808,663	83,999
6 "	"	'14	11,945,123	6,898,721	5,046,402	4,847,955	198,447
6 "	"	'13	12,239,537	7,136,034	5,103,503	4,796,161	307,342

*Includes taxes. †Includes adjustments. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Thirty-nine Cities Have at the Present Time Been Invaded by the Fare Snipers

Among the cities in which "jitney" bus services have been installed are Los Angeles, Oakland, Pasadena, Fresno, San Diego, San Francisco, Portland, Seattle, Tacoma, Vancouver, El Paso, Houston, Galveston, Ft. Worth, Dallas, Austin, San Antonio, Beaumont, Wichita, Lawrence, Topeka, Emporia, Kansas City, Joplin, St. Joseph, St. Louis, Ogden, Birmingham, Des Moines, Fort Smith, Oklahoma City, Tulsa, Denver, Baltimore, Sterling, Ill.; Pittsburg, Kan.; Omaha, New Orleans and Detroit.

"Jitney" owners in Kansas City have been besieging the casualty companies for liability insurance, but without success. A slight accident, when a small car, heavily loaded, overturned at a curve, injuring three persons, has brought to the attention of the drivers and owners the question of responsibility for damages. One insurance agent said: "We are very careful in writing liability on automobiles, and it is unlikely that any cars in the service have previously been covered. The car must be paid for or be backed by substantial assets before we write it. Such cars are not going into the 'jitney' business."

No action has been taken at Kansas City so far to cancel liability insurance on automobiles that are put into "jitney" service, but such procedure was intimated. Liability companies seem uncertain as to whether the usual double indemnity for injury while riding in a public conveyance would be collectible by the holder of a personal accident policy.

The Kansas City *Times* is carrying a column headed "Kansas City's 'Jitney' Service," under which the bus routes so far established are enumerated and number of cars and leaving times given wherever possible, and also the name of the person operating the route.

So significant does the San Antonio *Express* consider the bus situation that in its issue of Jan. 20 it reproduced under a heading from San Diego, Cal., the entire letter of William Clayton, managing director of the San Diego Electric Railway, addressed to the Common Council of that city. This communication had been published in abstract in the ELECTRIC RAILWAY JOURNAL.

The chief engineer of the Public Service Commission of the State of Washington has reported to Chairman Charles Reynolds of the commission in regard to the operation of the "jitney" buses in Seattle. He recommends that immediate action be taken to remedy the situation. According to the engineer the Seattle Electric Company is losing $2,450 in revenues daily, while the bus drivers are making an average net profit or wage of $2.33 a day. The report says that the 518 buses in that city are carrying 49,000 passengers daily who formerly rode on the electric street railways.

Councilman Allen Dale, of Seattle, is fathering a bill to compel bus owners to come under identical regulation with the street railways in the matter of handling passengers, gross earning tax, construction of bridges and maintenance of paved streets. Councilman Hesketh seeks to have the capacity of every vehicle operated for hire limited to its seating capacity. A third ordinance is in course of preparation to settle definite routes of travel through the downtown streets for buses. "Jitney" bus drivers will, however, come under the provisions of the ordinance recently passed by the City Council requiring all drivers of motor vehicles for hire to pass not only a medical examination but one as to proficiency in handling cars on crowded thoroughfares. This ordinance becomes effective on Feb. 7.

Objection to the operation of buses has taken a new turn at North Yakima, Wash. In that city the Electrical Workers' Union has gone on record as being opposed to the buses on the ground that they are jeopardizing the street railway service with the result that many street railway

men, among them electrical workers, will be thrown out of employment.

The "jitney" bus has made its appearance in Detroit, one car operating on Woodward Avenue the early part of the week ended Jan. 30. Newspaper announcements state that others are to be placed in service. It has also been announced that a company is to be organized to run the buses along systematic lines.

Interviewed by the Oklahoma *News* in regard to the "jitney" bus, George W. Knox, general manager of the Oklahoma Railway, said in part:

"I am not at all downhearted about the little pest that has, I am sure it will prove, temporarily infested itself upon us. It is only another example of one of the characteristic spasms of the American people to try something new, and the scheme will have to run its course, regardless of the economic features involved; that is, duplicating an already adequate service means someone is squandering or losing resources and the fiddler will have to be paid finally, and it is inevitable that the public will have to foot the bill.

"Anyone who owns an automobile, if he will take just a few moments of his time and will be honest with himself, will be able to demonstrate that by this system it is not possible to transport passengers for 5 cents, even short distances, at a profit. Taking a few concrete examples, here is a case where under most favorable conditions the 'jitney' service has been applied with the following results:

Average hours per day of cars in service	15
Average speed in miles, per hour	14
Average earnings per car, per hour, in cents	70
Average earning per car, per mile, in cents	5
Operating costs, in cents:	
Oil and gasoline, per mile	1
Tires and tubes, per mile	1
Maintenance, per mile	1½
Depreciation, per mile	1
Wages of operators, per mile	2
Total cost of operation per mile	6½

"The cars used in the above mentioned instance were the best type of light efficient machines made. If larger capacity cars are used, the cost of operation will be nearly doubled. As further evidence of the failure of the plan, it is known that a well-organized and equipped auto bus concern on the Pacific coast has had to go into the hands of a receiver and has quit business.

"I have always found the people of Oklahoma fair, and in fact, the great strides made in its wonderful development are due to the spirit of fairness manifested, one business toward the other, so it will be in this matter, further than this—ish ka bibble."

The State Board of Equalization of California, in its report, says:

"The Pacific Electric Railway, which has made careful observation of automobile competition with its lines, reports to this board that the company alone is losing $20,000 a month or $240,000 per annum from this cause. The State tax on that alone would have been $11,400. One company alone carried 122,686 passengers in a period of thirteen days with an estimated revenue of nearly $24,000. It is probable the State loss from this source is at least $200,000 per annum.

"In addition to the big double-deck buses and other large motors that ply over more or less regular routes and on a more or less definite time schedule, there are many smaller vehicles plying for hire on less regular schedules, all doing the same kind of business which comes under the purview of the State tax system. It would appear that the State tax system ought to be extended to cover these carriers, both to protect the State revenues and in justice to the taxed transportation companies."

The Denver Tramway Company has issued a modern fable, entitled "The Landlord," written by John A. Beeler, vice-president and general manager. In this fable the municipality represents the landlord; and the premises, the city streets. The moral is that the taxes and sums paid for city improvements by the tramway are of more importance to the landlord than the insignificant license fees paid by "jitney" bus operators. In addition to the franchise and general tax aggregating more than $200,000 per year, the tramway company pays interest on about $2,000,000 of bonds that have been issued for street paving, grading and other public improvements, which at 6 per cent amounts to about $120,000 per year. Repairs to paving and the removal of snow and ice average about $50,000 per year. These items total $370,000, all of which goes to the public good. On the contrary, however, if the proposed sixty-six "jitney" buses were permitted to operate under the ordinary $25 annual motor license, as they desire to do, they would pay $1,650 yearly and their operation would undoubtedly involve the city in tremendous police expense for handling the traffic.

It is said that nearly 85 per cent of the expenditures of the tramway company for combined construction and operation are made locally for home products, materials, fuel and wages. Exactly the opposite, however, is true of the "jitney" buses, for fully 85 per cent of their expenditures are made abroad for autos, tires, gasoline and repair parts. As regards accidents, too, the "jitney" buses are reported to be leaving behind them a trail of killed, maimed and injured in the Pacific coast cities, and the congestion in the streets there has become dangerous and alarming. In summing up the case, Mr. Beeler states that the success of the "jitney" bus depends upon their escaping the responsibility of paying for franchise rentals, street paving, grading, viaducts and other public burdens that have fallen upon the street car companies, and upon their stealing the cream of the transportation business. If such buses want to compete with electric railways, they should be required to do so on equal terms and under equal conditions.

THE COPPER ZONE SYSTEM

New Fare Collection System of Union Traction Company of Indiana Working Satisfactorily

Officials of the Union Traction Company of Indiana, which on Jan. 1 adopted the copper zone system for passenger fares, approved by the Public Service Commission of Indiana, state that the new system is working out very satisfactorily. With the introduction of the new zone plan a system of cash fare receipts was inaugurated to take the place of the recording fare registers which have been in use on the interurban cars of the company, and the fare registers have been removed from the cars. The fare receipts are in duplicate, passenger's fare receipt and auditor's stub, numbered consecutively and bound in pads. At the end of each run the conductor turns in the duplicate receipts in an envelope, and each day the stubs in the conductor's book and the cash fares for the day are audited at the principal offices of the company at Anderson.

The management of the company believes that the new system of fare receipts is proving most satisfactory in obtaining an accurate accounting of all fares collected from passengers on the cars. Since the new copper zone system went into effect an increase has been shown in the number of passengers who purchase tickets before boarding the cars. In fact, it is estimated that more than 85 per cent of the passengers are now purchasing tickets at the stations. Under the new copper zone system the company files tariffs which put into effect on its lines in Indiana rates which approximated 2 cents a mile for the actual distance traveled, with a minimum of 5 cents. Commutation tickets are sold in books of twenty round trips at the rate of 1½ cents a mile, and the sale of round-trip tickets at an amount less than two full one-way fares was discontinued. Many inequalities in the old nickel zone system have been eliminated by the adoption of the new system.

TICKET SALES AT BOOTHS IN KANSAS CITY

The middle of January the Metropolitan Street Railway, Kansas City, Mo., built a booth at the corner curb line where passengers for and from the new union station are handled. General agents of the company, as they are called, occupy this booth from the first regular car in the morning until midnight, chiefly to answer questions as to destination and routes, and to look after the running of the cars. Incidentally, tickets are sold at 5 cents each—no reduction for quantities—at the booth. There was some doubt as to how extensively the opportunity to buy single-ride tickets would be taken advantage of, but the feature has proved very

popular. Half-fare tickets are also sold at the booth. Heretofore the full-fare tickets have been purchased at the company's offices, chiefly by firms which provide their employees with transportation. Conductors sell half-fare tickets only.

No Reduction in Traffic in Washington.—The Washington Railway & Electric Company has been informed by the Public Utilities Commission of the District of Columbia that observations made by its inspectors show that the service now in force is demanded by traffic conditions and must be continued.

Chicago to Issue Official Booklet of Traffic Facts.—It was decided at a recent meeting of the committee on local transportation of the City Council of Chicago, Ill., to authorize R. F. Kelker, Jr., traction supervisor, to prepare a booklet of facts not generally known to the public regarding street railway service in the city.

Brooklyn Inquiry Concluded.—The inquiry being conducted by the Public Service Commission of the First District of New York into the adequacy of the service of the surface lines of the Brooklyn Rapid Transit Company was concluded on Feb. 1. The principal witness was Slaughter W. Huff, vice-president of the company.

Louisville-Indianapolis Hearing.—The Louisville Board of Trade has received notification of indefinite postponement of the hearing before the Interstate Commerce Commission in connection with the reopened case against the Indianapolis, Columbus & Southern Traction Company and other lines connecting with Indianapolis. The hearing was to have been held on Jan. 29.

New Freight Rates.—The Mahoning & Shenango Railway & Light Company has filed a revision of its freight rates with the Interstate Commerce Commission and the Ohio and Pennsylvania commissions, to become effective on Feb. 15. The new tariff provides for through rates over all lines of the system based on the distance freight is carried. A small increase is made in the rates for milk.

New Indianapolis Traffic Ordinance.—The City Council of Indianapolis recently passed an ordinance, which is now being put into effect, requiring that all cars shall stop on signal on the far side as well as the near side of certain street intersections in the downtown district, where the distance over the crossing is very considerable on account of the intersection of wide north and south streets with diagonal avenues.

Decision in Atlanta Service Case.—In its decision upon the petition of the Georgia Railway & Power Company, Atlanta, Ga., to curtail its service on fourteen lines in Atlanta, the State Railroad Commission has granted in full the prayer of the company for curtailments on two routes and granted in part or conditionally the company's petition regarding five other lines. The other seven lines were not allowed to be changed.

New Street Rule in Detroit.—A new stopping ordinance has been passed recently in Detroit, Mich., which permits the driver of a vehicle to pass between the running board or lower step of a car headed in the same direction, when stopping to discharge or take on passengers, provided there is a 6-ft. clearance between the car step and the vehicle. If it is not possible to allow this clearance the vehicle is required to stop at least 6 ft. from the rear end of the car.

Change in Zone System Denied.—The Public Service Commission of Maryland has rendered a decision in the case of F. L. Hawley versus the City & Suburban Railway, Washington, D. C. The question at issue was the division of the line for the boundary of the District of Columbia to Laurel into five zones with a cash fare of 5 cents for each. The complainant desired four zones with the same fare, but the commission decided that the Interstate Commerce Commission under the Shreveport decision had the final authority in the matter, and it, in establishing six zones between Laurel and Washington, had already provided five between Laurel and the district boundary.

Fares in Edmonton.—The following fares were put into effect on the Edmonton (Alta.) Municipal Electric Railway on Dec. 15: Regular fare, 5 cents cash; tickets (lilac), five for 25 cents, good at all hours; tickets (brown), six for 25 cents, good from 6 a. m. to 8 a. m., 12 noon to 2 p. m., 5 p. m. to 7 p. m., not good on Sundays or public holidays; children's tickets (green) from five to fourteen years, ten for 25 cents. Two children are permitted to travel on 5 cents cash or one regular ticket. A double fare is charged after midnight, payable in cash or tickets. Tickets intended for use by persons on city's business are sold at the rate of twenty-five for $1.

Answer to Albany Suit.—Ledyard P. Hale, counsel to the Public Service Commission for the Second District of New York, has filed an answer to the writ of certiorari obtained by the United Traction Company, Albany, for a review of the commission's order requiring better service from the company in Albany. In the answer Mr. Hale denies that the commission's order is illegal or erroneous and states that a hearing is the proper method of offering any additional facts by the company and that a rehearing of the case is not necessary. The papers in the case will be printed immediately and an argument had before the Appellate Division in the first week of the term beginning March 2.

Traffic Survey in New Orleans.—D. D. Curran, president of the New Orleans Railway & Light Company, New Orleans, La., has presented to the Mayor of that city a summary of a traffic survey of most of the lines of the company for the period from Dec. 7 to Dec. 12, inclusive. In its communication to the Mayor the company says that since making the check it has added twenty-one cars to the various lines of its system and at the present time is operating a total of 443 cars daily, as compared with 422 for the same period of last year. In addition to this, the company has replaced fourteen large cars seating fifty-two persons each on the St. Charles and the Tulane Belt lines for fourteen smaller cars with a seating capacity of twenty-eight each. A traffic bureau has been organized to check traffic on all the lines of its system.

Highway Accidents in New York and New Jersey.—One-third fewer deaths in January in the streets of New York than a year ago are reported by the National Highways Protective Society, which estimates that the traffic on the streets has fallen off 30 per cent, 10 per cent of which is commercial traffic. During January, 1915, sixteen children lost their lives, fourteen being killed by automobiles, one by electric railway and one by wagon. The total number of persons killed was thirty-one, of which number automobiles killed twenty-three, electric railways four and wagons four. The number of persons killed on the streets and highways of New York State, outside of New York City, during the past month was eleven. Automobiles caused the death of seven and electric railways four, as compared with five by automobiles, five by electric railways and one by wagon in January, 1914. In New Jersey thirteen persons were killed by automobiles, as compared with eight during the month of January, 1914. Nine persons were killed at railroad grade crossings in New York and six in New Jersey during January.

Fare Order Respite.—Under the stipulation reached recently by the officers and patrons of the Seattle-Everett Interurban Railway the order of the State Public Service Commission of Washington of Dec. 24, reducing the rate charged by the company from 3 cents to 2 cents per mile has been deferred for a period of six months. The stipulation will ask the commission to validate the old schedule of rates, except that the company will issue a twenty-five ride book from the city limits to Seattle, as follows: To Lake Ballinger and intermediate points at the rate of 2 cents a mile; to Esperance, at the rate of 2.1 cents a mile; to Seattle Heights, at the rate of 2.2 cents a mile; to Cedar Valley substation, at the rate of 2.3 cents a mile; to Alderwood Manor, at the rate of 2.4 cents a mile; from the city limits of Everett to Silver Lake and intermediate points, at the rate of 2 cents a mile; the minimum fare in the case of a twenty-five ride ticket book to be 5 cents, the coupons to be good for transportation when presented with the book. The twenty-five ride ticket book, if continued beyond the term of six months' trial period, is to be good for one year from the date of sale. Pending a six months' trial of this experiment, no action will be taken upon the commission's order or the company's petition for rehearing.

Personal Mention

Mr. C. W. Colvin has been appointed transmission engineer of the British Columbia Electric Railway, Vancouver, B. C.

Mr. C. A. Hoag, who has been the assistant secretary and assistant treasurer of the Hagerstown & Frederick Railway, Hagerstown, Md., has resigned.

Mr. Alexander Armstrong, Jr., was elected assistant treasurer of the Hagerstown & Frederick Railway, Frederick, Md., to succeed Mr. C. A. Hoag, resigned.

Mr. J. L. Baird, heretofore assistant secretary and treasurer of the Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont., has been appointed auditor.

Mr. Carl D. Jackson, Oshkosh, has been confirmed by the Wisconsin Senate as the successor to Mr. John H. Roemer on the Railroad Commission of that State.

Mr. C. Loop, who has been acting roadmaster of the Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont., for the last year, has been appointed roadmaster.

Mr. A. R. Keele, heretofore assistant dispatcher of the Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont., has been appointed chief dispatcher of the company.

Mr. C. D. Flanigan, vice-president and general manager of the Athens Railway & Electric Company, Athens, Ga., has been elected president of the Athens Chamber of Commerce.

Mr. George Bullock has been elected chairman of the board of directors of the United Gas & Electric Engineering Corporation, New York, N. Y. He was formerly president of that company.

Mr. W. L. Palmer has resigned as claim agent for the Illinois Northern Utilities Company, at Dixon, Ill., to become claim agent for the Terra Haute division of the Terra Haute, Indianapolis & Eastern Traction Company.

Mr. A. Baltzer, heretofore shop foreman of the Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont., has been appointed master mechanic of the company in charge of shops and all work in connection therewith.

Mr. S. J. Dill, vice-president of the United Gas & Electric Engineering Corporation, New York, N. Y., has been placed in charge of the work of that company in the South, with headquarters at 201 Baronne Street, New Orleans, La.

Mr. Charles C. Mumford, one of the trustees of the Rhode Island Company, Providence, R. I., appointed by the Federal Department of Justice, has been elected president of the leased Providence & Danielson Railway to succeed Mr. D. F. Sherman.

Mr. C. P. Cooper has been appointed superintendent of the Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont., in charge of general operation. He has been with the company in various capacities from its construction days, and has been chief dispatcher for four years.

Mr. S. H. Bennett, general auditor Hagerstown & Frederick Railway, Frederick, Md., was elected assistant secretary of the company at the recent annual meeting, to succeed Mr. C. A. Hoag, resigned. Mr. Bennett will, in addition to this office, continue to hold that of general auditor.

Mr. J. S. Pevear, formerly president of the New Orleans Railway & Light Company, New Orleans, La., has been elected president of the United Gas & Electric Engineering Corporation, New York, N. Y., to succeed Mr. George Bullock, who has been elected chairman of the board of directors.

Mr. F. Howard Warfield, trust officer of the Fidelity Trust Company, Baltimore, Md., was elected vice-president of the Hagerstown & Frederick Railway, Frederick, Md., at the recent annual meeting of the railway. This office is a new one in addition to the vice-presidency held by Mr. Henry Holzapfel, who was re-elected.

Mr. F. S. Barnard, Victoria, B. C., who has been appointed Lieutenant-Governor of British Columbia, was born at Toronto, Ont., on May 16, 1856, and has been associated with the British Columbia Electric Railway for many years, acting recently as local adviser to the directors, most of whom reside in London, England.

Mr. Beecher W. Waltermire, an attorney of Findlay, has been appointed by Governor Willis to succeed Mr. E. W. Doty as a member of the Ohio Public Utilities Commission. Mr. Doty's term expired on Feb. 1. Mr. Waltermire was a candidate for lieutenant-governor in 1912 and has been successful on the lecture platform. He took part in the campaign for Governor Willis.

Mr. Pope Y. White, who has been appointed editor of the United Railways *Bulletin*, published in the interest of the employees of the United Railways, St. Louis, Mo., was engaged in daily newspaper work for fourteen years, advancing from reporter to telegraph editor, make-up editor, news editor and finally city editor, which place on the St. Louis *Times* he resigned to become connected with the United Railways.

Mr. Walter Alexander, Milwaukee, has been nominated as a member of the Railroad Commission of Wisconsin to succeed Mr. David Harlowe. For the last five years Mr. Alexander has been district master mechanic for the Chicago, Milwaukee & St. Paul Railway with headquarters at Milwaukee. Previous to this time he served on the faculties of the University of Wisconsin, Armour Institute and the University of Missouri.

Mr. Hugh McCloskey has resigned as chairman of the board of directors of the New Orleans Railway & Light Company, New Orleans, La. Mr. McCloskey was elected chairman of the board of the company and president of the American Cities Company in October, 1913. He first became identified with railway work in New Orleans as a member of the board of directors of one of the subsidiary companies under the New Orleans Railway & Light Company.

Mr. Russell A. Sears, to whom was awarded the silver replica of the Anthony N. Brady safety medal, was born in New York in 1869, but was educated in the Boston public schools. He was admitted to the Massachusetts Bar in 1890 and for fifteen years was associated in law practice with Samuel L. Powers. He resides at Quincy, Mass., of which he was Mayor in 1898 and city solicitor in 1900 and 1901. He had early association with various street railways now comprising the Middlesex & Boston Street Railway before its consolidation with some of the street railways now included in the Bay State Street Railway. He has been associated with the Boston Elevated Railway as general attorney since October, 1902. In addition to his Boston Elevated activities, Mr. Sears is a director of the Massachusetts Employees' Insurance Association, the Granite Trust Company and the Citizens' Gas Light Company. Mr. Sears was nominated by his company to receive the safety award because he has taken a leading part in accident reduction. In addition to the activities mentioned elsewhere in this issue he has developed the machinery of his department to promote safe operation. For example, the department diligently prosecutes in the criminal courts all persons who make traveling upon the cars unpleasant and dangerous. Again, in connection with the department, accident clerks are appointed to spend their time in carhouses and lobbies instructing employees on safety matters. Mr. Sears supervises the work of the general secretary of safety committees. He has also organized a number of public campaigns, among them being one against the stealing of rides and the jumping on and off cars. Another was one to stimulate the writing of safety verses in the schools by means of a prize contest. A special campaign against drunkenness upon street cars gave excellent results.



R. A. SEARS

Mr. William W. Chisholm, who has been appointed electrical engineer of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., was born at Caradoc, Ont., on Oct. 17, 1876. He entered railway service in June, 1896, and to April, 1897, was switchman on the Michigan Central Railroad, St. Thomas, Ont. From April, 1897, to March, 1898, he was yard conductor and assistant yardmaster of the Toronto, Hamilton & Buffalo Railway, Hamilton, Ont. From March, 1898, to June, 1903, he was brakeman of the Michigan Central Railroad, St. Thomas, Ont. In May, 1905, he became assistant chief engineer of the city pumping station at St. Thomas, Ont., and since November, 1907, he has been chief engineer of the power plant of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.

Mr. Henry V. Neal, to whom was recently awarded the bronze replica of the Anthony N. Brady medal, is sixty-six years of age. He has been in the employ of the Boston Elevated Railway for twenty-one years and is at present a mechanic in the Albany Street shops. Before coming to the Boston Elevated Railway, he was in the employ of the Hinckley Locomotive Works for thirteen years and the Boston & Albany Railroad for nine years, and was actively interested in the emergency work of the latter company. Mr. Neal for many years has been deeply interested in medical matters. In the early eighties, while with the Hinckley Company he took a course of emergency lectures, and later helped to organize an emergency class while with the Boston & Albany Railroad. In connection with this work he acted as assistant demonstrator during another lecture course. All of this preparation has well fitted Mr. Neal to take up his present activities, which are mentioned in connection with the digest of the Brady medal committee report elsewhere in this issue.



H. V. NEAL

OBITUARY

James D. Parker, one of the promoters of the Sandusky, Milan & Norwalk Electric Railway, now included in the system of the Lake Shore Electric Railway, Cleveland, Ohio, is dead.

John C. Brewster, superintendent of construction during the building of the Muskegon (Mich.) Street Railway, now included in the system of the Muskegon Traction & Light Company, is dead. Mr. Brewster was born on June 5, 1829, in New York. He located in Muskegon in 1869 as a civil engineer. He was interested in the construction of the Chicago & Michigan Railroad and the Grarnd Rapids & Indiana Railway.

John Wesley Richardson, general superintendent of the Kansas City-Western Railway, Kansas City, Kan., is dead. Mr. Richardson was born at Freeman, Mo., on March 25, 1867. When seventeen years old he entered the employ of Holmes Brothers with the local railway lines in Kansas City. Later he became superintendent of one of the divisions of the Metropolitan Street Railway in Kansas City, and in June, 1905, was made general superintendent of the Kansas City-Western Railway.

John M. Mack, financier and contractor, who took a prominent part in the organization of the Philadelphia (Pa.) Rapid Transit Company, is dead. Mr. Mack was born in Philadelphia on Aug. 15, 1852. He was educated in the public schools there and in 1872 began business as a contractor. He was largely responsible for organizing the Asphalt Company of America. He was formerly president and a director of the Barber Asphalt Paving Company, the General Asphalt Company, the Mack Paving & Construction Company, the Norwich Compressed-Air Power Company, the Hamburg Vitrified Brick Company, the Railways Company General, and was president of the Manhattan Trap Rock Company. Mr. Mack retired some time ago from active business.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***McConnellsburg & Fort London Railway, McConnellsburg, Pa.**—Application for a charter has been made by this company in Pennsylvania to build an electric railway between McConnellsburg, Pa., and Fort London in Peters Township, Pa. Incorporators: Edward J. Post, D. H. Patterson, Herbert A. Duffy, George A. Harris and B. C. Lamberson.

Portland, Vancouver & Northern Railway, Vancouver, Wash.—Chartered in Washington to build an electric railway between Portland, Ore., and Vancouver, Wash. Capital stock, $300,000. Henry Crass, 511 United States Bank Building, Vancouver, Wash., president, and G. W. Ford, Vancouver, secretary. [E. R. J., Jan. 19, '15.]

FRANCHISES

Fresno, Cal.—The Fresno Interurban Railway has asked the Council for a franchise over certain streets in Fresno.

Los Angeles, Cal.—Upon being informed that the Los Angeles Railway corporation is desirous of removing certain tracks on Thirty-ninth Street, which is to form an entrance to Exposition Park, the Park Commission has approved new plans for the street approach to the park in question.

Riverside, Cal.—Floyd Brown and associates have asked the Board of Supervisors for a fifty-year franchise to build an electric railway along the county highway in Riverside, and by motion it was decided to advertise for bids on the franchise to be opened March 3.

***Santa Barbara, Cal.**—Application has been made to the City Council by Richard Hamilton Gaud for a franchise granting the right to construct an electric railway upon certain streets in Santa Barbara until March 15, 1957. The Council will receive sealed bids up to Feb. 18 for the franchise.

Murphysboro, Ill.—The Murphysboro & Southern Illinois Railway will ask the Mayor and City Council for a franchise in Murphysboro on Feb. 9.

Albany, N. Y.—The International Railway has received permission by the Public Service Commission in Albany to construct its high-speed electric line between Buffalo and Niagara Falls. Permission was also given the railway to issue 3 per cent fifty-year refunding and improvement mortgage bonds for $2,395,000 to be sold at not less than 87. The new line is to start in Buffalo at the intersection of the Buffalo & Lockport line and run out Main Street through Tonawanda over the old Buffalo, Thousand Islands & Portland Railroad line, through North Tonawanda, Wheatfield, La Salle into Niagara Falls.

Buffalo, N. Y.—The Frontier Electric Railway has received a franchise to extend its lines across Kenmore Avenue, Main Street and intervening streets in Buffalo.

Buffalo, N. Y.—The International Railway has accepted the franchise recently granted it by the Tonawanda Common Council giving it the right to build a double-track line from Buffalo to Niagara Falls. In the acceptance, the company placed a clause giving it the right to cancel the grant at any time before the building of the new line is begun. The company will also accept the North Tonawanda franchise on the same condition.

***Clymer, N. Y.**—The Columbus & Mayville Railroad has asked the Council for a franchise in Clymer. This is part of a plan to build an electric railway between Jamestown and Clymer.

New Rochelle, N. Y.—The trolley committee of the City Club of New Rochelle has asked the Council to grant the Westchester Electric Railway a franchise to build a new electric line from Mount Vernon through Winyah Avenue, to connect the end of the line in North Pelham with North Avenue, and to extend these cars to Hudson Park and double-track Franklin Avenue.

East Linden, Ohio.—On Jan. 27 the commissioners of Franklin County granted the East Linden Electric Railway a franchise for a line between the Leonard Avenue viaduct in Columbus and East Linden. Work must be begun within two years and the fare is to be 5 cents until the net income exceeds 6 per cent on the investment, when it is to be reduced to the rate of six tickets for 25 cents. Further decrease of the fare is provided as the income increases.

Toronto, Ont.—The City Council has authorized the issue of debentures to the amount of $455,961 for civic lines in Toronto. The City Council authorized the issue of debentures, amounting to $66,418, for acquiring the portion of the Scarboro division of the Toronto & York Radial Railway within the city limits.

McConnellsburg, Pa.—The McConnellsburg & Fort London Railway has received a fifty-year franchise from the Council in McConnellsburg. This is part of a plan to build an electric line between McConnellsburg and Fort London.

***Knoxville, Tenn.**—M. K. Bell has asked the County Court for a franchise for an electric interurban railway from Knoxville to Bristol and Newport.

Seattle, Wash.—The City Council of Seattle has voted to submit at the March election the ordinance of Councilman Erickson to extend Division A of the municipal electric railway into Ballard.

TRACK AND ROADWAY

Gadsden, Ala.—Application for a charter will soon be made by Louis Hart to build an electric railway from Gadsden to Centre. It is expected the capital stock will be at least $250,000, although the preliminary organization of the company may be effected on a smaller amount. Property holders of Centre are greatly interested in the project and will give material assistance. Power will be purchased from the Alabama Power Company. [E. R. J., Jan. 30, '15.]

Mobile Light & Railroad Company, Mobile, Ala.—This company has in contemplation extensive improvements of its lines provided the franchise rights are secured. The company has been considering these improvements for some time, and it is expected that if the proper negotiations are completed the work will begin in the near future.

Tramways Company, Ltd., Edmonton, Alta.—The agreement between the Edmonton City Council and this company has been ratified by the ratepayers. The directors are: A. E. Farncomb, president; H. Stutchbury, S. D. Hogan, G. G. Reedwell, S. Carson, W. Golley and S. H. Smith. It is reported that the company has already graded several miles from the city limits and has bought right-of-way from the landholders along the side of the road allowance.

San Jose & Almaden Railway, San Jose, Cal.—The project to build a 12-mile electric line between Almaden, San Jose and Hacienda has been abandoned. [E. R. J., Sept. 28, '12.]

Jacksonville, Fla.—The new interurban electric railway from Jacksonville to Middleburg, on which construction was recently begun, in addition to being in shape to go ahead with its building for the first 10 miles, has the co-operation of every land owner along the line. These have contracted to give time, labor and ties, in addition to offering to take stock in the company as soon as the organization is completed.

Miami (Fla.) Traction Company.—Work has been resumed by this company on its line in Miami. It is planned to have 2 miles of track laid by March 1. B. B. Tatum, Miami, president. [E. R. J., Nov. 21, '14.]

Tarpon Springs, Fla.—Plans to build an interurban railway from Tarpon Springs to St. Petersburg are under consideration. The line will be 12 miles long and will be operated with gasoline motive power. M. L. Waggoner, Third Avenue, South, St. Petersburg, is interested. [E. R. J., April 25, '14.]

Macon Railway & Light Company, Macon, Ga.—The work of relocating the track on College Street, removing it from the lower edge of Tattnall Square and placing it in the center of the street, will be begun at once by this company.

Union Traction Company, Coffeyville, Kan.—This company has placed in operation its extension to Nowata. Other extensions are contemplated.

Manhattan, Kan.—Municipal bonds to the amount of $20,000, voted in 1910 as a bonus to the Manhattan City & Interurban Railway when it should complete a line to Fort Riley, were turned over to the traction company on Jan. 23, the line having been placed in operation three months ago.

Arkansas Valley Interurban Railway, Wichita, Kan.—Plans are being considered to build soon the extension to Hutchinson. Extensions to Great Bend, Larned and other western towns are also being considered and plans are also contemplated for extensions northward, probably to McPherson and Salina.

Kentucky Traction & Terminal Company, Lexington, Ky.—Orders have been placed by this company with the Hardwick Lumber Company, Winchester, for 30,000 crossties, which are for use in the reconstruction of the railway.

Louisville & Interurban Railway, Louisville, Ky.—Plans are being made by this company for a 7-mile extension from Fern Creek to Mount Washington.

Louisville (Ky.) Railway.—There will be no extension of the Walnut Street line in Louisville from the present terminal in Parkland to the State Fair grounds at the present time. The board of directors of the company so decided at their regular January meeting recently.

Southwestern Traction & Power Company, New Iberia, La.—Plans are being made for the construction of an electric railroad from New Iberia, La., to St. Martinville, a distance of 10.5 miles, also from Jeanerette, La., through Franklin, Baldwin and Patterson, to Berwich, a distance of 50 miles. No contracts have been let, but it is expected that work will soon be begun. W. S. Henning, New Iberia, La., is chief engineer.

***New Orleans, La.**—Plans are being made to build a double-track electric railway for the section of the city below Canal Street. Among those interested are: Charles Torreogrossa and Joseph F. Ebert, New Orleans.

Orleans-Kenner Electric Railway, New Orleans, La.—Work has been begun by this company on the construction of the Metairie Ridge loop line in New Orleans. [E. R. J., Jan. 9, '15.]

Shreveport (La.) Traction Company.—Plans are being made to build an extension from Waverly to South Highlands, about 1½ miles, in Shreveport.

Asbury Park, N. J.—Harry W. Smock, retiring president of the Chamber of Commerce, is reported as stating that the recently talked of Trenton to Asbury Park electric railway is now assured. He announces that the line will run through Allentown, Lakewood, Farmingdale and Hamilton and thus into Asbury Park with a spur from Lakewood to Point Pleasant. The project will go through, he assured chamber members, without local financial aid.

Trenton & Mercer County Traction Company, Trenton, N. J.—Wilbur residents are agitating the extension of the Hamilton Avenue line into East Trenton. The present terminus of this branch is Olden Avenue and State Street. The plan is to have the tracks extended to the corner of Clinton Avenue and Olden Avenue.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—This company has been asked to buy the Buffalo-Susquehanna Railway extending between Buffalo and Wellsville. The proposition is to electrify the Buffalo-Susquehanna Railway which would provide an outlet into Buffalo. It is understood the Chamber of Commerce of Olean and the towns of Friendship, Franklinville, Wellsville and others would aid such an undertaking.

Goldsboro, N. C.—The House of Representatives at Raleigh, N. C., has passed on third reading the bill authorizing the city of Goldsboro to issue bonds for municipal street railway purposes.

Pictou County Electric Company, Ltd., Stellarton, N. S.—This company has under consideration the construction of an extension from Potiers Bridge to Pardale, N. S., ½ mile. L. T. Flaherty, New Glasgow, N. S., manager.

Youngstown & Southern Railway, Youngstown, Ohio.—David Tod, receiver for this railway, has announced that the line will be double tracked from Youngstown to Southern Park, where the racetrack is located. He will soon ask the Council for a franchise for this work.

Toronto (Ont.) Eastern Railway.—This company has an application before the Dominion Parliament asking for an extension of time for completing the line authorized to be built from Toronto easterly to Cobourg, Ont., with branches as follows: From Cobourg or Port Hope northerly to Peterborough; from Scarborough to Markham, Stouffville or Uxbridge; from Oshawa northerly via Lake Scugog to Lindsay; from Oshawa southerly to Lake Ontario.

Niagara, Welland & Lake Erie Railway, Welland, Ont.—This company has an application before the Ontario Legislature for the confirmation of an agreement granting the right to the company to operate a railway in Welland, and the confirmation of a second agreement fixing the assessment of the company's property there at specific sums for five-year periods, terminating in 1934.

Portland & Oregon City Railway, Portland, Ore.—This railway will be completed and in operation to Baker's Bridge, 16 miles from Portland end, early this spring,

Lancaster & Berks Electric Railway, Lancaster, Pa.—Plans are being contemplated by this company to change its route to Womelsdorf for the proposed spur line that was to have been laid from Kleinfeltersville to Womelsdorf. It has been stated that the line will now be constructed along an altogether different route, passing through Reistville, Richland and Stricklerstown. It is said that the reason for abandoning the original project is that the right-of-way could not be secured at a nominal cost. The new spur would connect with the Ephrata & Lebanon lines.

Montreal (Que.) Tramways Company.—The Quebec Legislature is being asked by the town of Mount Royal for an extension of time within which it may make arrangements with this company and the Montreal Public Service Corporation for the building of electric railways, etc.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—In advance of the paving of Elmwood Avenue by the city, this company will lay a new track down Elmwood Avenue and erect concrete poles. The company will soon replace the wooden poles on Lady Street with iron poles.

Brenham, Tex.—Washington will join in the project to build an interurban electric railway from Brenham via William Penn and Independence, thence through the Brazos section. This will add 6 miles more to the route already surveyed. Outside capital is very much interested in the construction of this interurban line. L. M. Hewitt, Bryan, is interested. [E. R. J., Jan. 30, '15.]

El Paso Electric Belt Line, El Paso, Tex.—No definite plans have yet been formulated by this company for the construction of its proposed electric railway from the center of El Paso through suburbs to Woodlawn addition, east of El Paso. Thomas P. Ruddy, Kansas City, is interested. [E. R. J., Nov. 14, '14.]

San Angelo (Tex.) Street Railway.—Plans are being considered by this company to extend its lines in San Angelo to Austin, a distance of about 75 miles.

Lynchburg Traction & Light Company, Lynchburg, Va.—This company contemplates the construction of an extension to Madison Heights over the proposed viaduct from Seventh Street and Commerce Street across the James River in Lynchburg.

***Radford, Va.**—Plans for the construction of an electric railway from Willis, in Floyd County, to Radford, Va., 28 miles, are being considered by residents of that county and the Radford Board of Trade. It is understood that Floyd County people will subscribe about $100,000 to the stock of a company which may be formed to build the railway, and that they will pay for it in crossties and labor. A. J. McClung, secretary of the Radford Board of Trade, may be able to give further information.

Tacoma (Wash.) Municipal Railway.—The first line of this railway has been placed in operation in Tacoma. It will be known as the Tide Flats line and will operate from Pacific Avenue and Eleventh Street to the shops of the Chicago, Milwaukee & St. Paul Railway. The line will be operated under lease by the Stone & Webster Corporation.

West Virginia Traction & Electric Company, Wheeling, W. Va.—It has been officially stated that this company is contemplating many improvements of its lines in Wheeling during 1915.

SHOPS AND BUILDINGS

Kankakee & Urbana Traction Company, Urbana, Ill.—T. W. Shelton, superintendent of this company, has just completed the plans for a new station for the company at Rantoul. It will be on the site of the present structure. Work will be begun as soon as the weather will permit. The new structure will be of brick, 20 ft. x 50 ft., and so arranged that 100 ft. more can be added to it when necessary. The front will be used as a waiting room for passengers, and in the center will be the ticket office. The rear part will be used as a freight room, switches being run to it to make loading and unloading easy.

Berkshire Street Railway, Pittsfield, Mass.—This company has opened a new passenger station in Pittsfield.

Piedmont & Northern Railway, Charlotte, N. C.—The offices of this company have been moved from the former place on Main Street to the new office on Washington Street over the new depot.

Cleveland (Ohio) Railway.—Plans are being made by this company to ask the City Council for permission to purchase 19 acres of land near the Big Four Railroad at Denison Avenue and Ridge Avenue in Cleveland on which the company plans to build new carhouses. The land will cost $60,000.

Texas Traction Company, Dallas, Tex.—Negotiations are now being conducted between the Southern Traction Company and Texas Traction Company, of Dallas, and the Dallas Interurban Terminal Association for the right of the cars of the lines mentioned to use the shed and station privileges of the new interurban terminal station which the association will erect. This is one of the most important details of the erection of the new interurban terminal station by the Stone & Webster interests. It was the former purpose of the Strickland-Goodwin Managerial Association, controlling the operation of the Texas and Southern Traction companies, to build a station of their own out of the present Santa Fé depot at Commerce and Murphy Streets. They bought control of this property some months ago. If the new contract is made, their plans will probably be changed. The Southern Traction and Texas Traction Companies hold franchises on Commerce Street at the present time, so that no changes would have to be made in order to reach the new stations. The franchise on the streets entering the station itself is a blanket franchise, issued to the association, covering all lines.

POWER HOUSES AND SUBSTATIONS

United Railroads of San Francisco, San Francisco, Cal.—Work will shortly be begun by this company on the construction of a new substation on Eighth Avenue, near Geary Street, in San Francisco. This substation is designed to handle all cars operated in the Richmond district. The ultimate capacity of the new substation will be 6000-kw, equivalent to approximately 10,000 hp.

Rockingham Light & Power Company, Portsmouth, N. H.—The electric machinery, formerly in use at the power house of the Portsmouth & Exeter Street Railway, now abandoned, at Stratham, is being moved by the Rockingham Light & Power Company to Portsmouth, where it will be installed at the Daniel Street plant and connected up with the power lines. The lot includes a rotary converter, transformers, switchboards and other equipment.

Toronto (Ont.) Suburban Street Railway.—Contracts have been awarded by this company for three substations on its Toronto to Guelph line, at Islington, Georgetown and Guelph, Ont. The latter will have 1000-kw. capacity, in two 500-kw units, while each of the other two will have a single 500-kw unit, with provisions for the addition of a similar unit in the future. Power will be received at 25,000 volts, alternating current, three-phase, twenty-five-cycle, and will be stepped down and passed through 500-kw rotary converters, which will deliver to the line at 1500 volts direct current. The Georgetown and Guelph stations will contain waiting, baggage and express rooms and dispatching offices, providing railway station facilities.

San Angelo (Tex.) Street Railway.—Plans are being considered by this company to build a new power house in San Angelo.

Manufactures and Supplies

ROLLING STOCK

Reading (Pa.) Transit & Light Company is contemplating the purchase of a few cars.

Iowa Railway & Light Company, Boone, Ia., is reported as expecting to buy four cars.

International Railway, Buffalo, N. Y., is reported as figuring on buying twenty-five cars.

Sioux City (Ia.) Service Company is reported as expecting possibly to rebuild five city cars.

Oakwood Street Railway, Dayton, Ohio, is reported as expecting to rebuild cars in its own shops.

Columbia (S. C.) Railway, Gas & Electric Company is reported as expecting to purchase new cars.

Dayton & Troy Electric Railway, Dayton, Ohio, is reported as expecting to buy three interurban cars.

Birmingham & Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., during 1915 will purchase four passenger cars.

Somerset Traction Company, Skowhegan, Me., expects to purchase one semi-convertible combination passenger and baggage car.

Columbus Railway & Light Company, Columbus, Ohio, is rumored as considering the possible purchase of twenty-five or fifteen city cars.

Hagerstown & Frederick Electric Railway, Frederick, Md., has ordered two electric freight locomotives of 25 tons each from the General Electric Company.

Arkansas Valley Interurban Railway, Wichita, Kan., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 30, 1915, as expecting to purchase one car, has ordered this equipment from the Cincinnati Car Company.

Tampa & Gulf Coast Railway, Tampa, Fla., contemplates either electric storage-battery or gasoline motor car operation on its recently completed line between Tampa and St. Petersburg, Fla. Other cars will be purchased for similar service between Tarpon Springs and Port Richey.

Union Electric Company, Dubuque, Ia., which operates all the electric utilities in that city, placed in service during 1914 two electric buses which run on a twenty-minute schedule between Dubuque, Ia., and East Dubuque, Ill. This service, which could not be furnished in any other manner, has proved so popular that an order has recently been placed with the General Vehicle Company, Long Island City, N. Y., for a third bus.

Shore Line Electric Railway, Norwich, Conn., has specified the following details for the ten semi-convertible cars recently ordered from the Wason Manufacturing Company:

Date of delivery, during May	Control West. H. L.
Seating capacity 52	Couplers West C-I
Weight of car body, 20,000 lb.	Curtain fixtures.....National
Bolster centers.....24 ft.	Curtain material...Pantasote
Length of body over corner posts 36 ft.	Gongs Dedenda
Length over vestibule, 45 ft. 5 in.	Hand brakes, Peacock, no staff
Height, rail to floor..40½ in.	Heaters Consol.
Height, floor to trolley board, 8 ft. 4½ in.	Headlights Golden Glow
Width over sills...8 ft. 2 in.	Motors.....four, inside hung
Width over all....8 ft. 4 in.	Registers No. 5 Sterling
Body metal	Sanders Sterling
Interior trim.....mahogany	Sash fixtures.....Brill
Headlining Agasote	Seating material.....rattan
Roof arch	Springs Brill
Underframe metal	Steps Stanwood
Air brakes....West. S. M. E.	Trolley Catchers..Earll No. 7
	Trolley base....U. S. No. 15
	Trucks...Brill No. 27 MCB 1
	Ventilators Brill
	Wheels.....Midvale, 34 in.

Metropolitan Street Railway Company, Kansas City, Mo., has advised through the board of control that it will let a contract on Feb. 8 for fifty new cars to be delivered April 15. Specifications call for single-end, double-truck cars with an inclosed rear door and folding step with motorman's red light signal for starting the car. White enamel decorating is to be used and 50 per cent more heaters will be provided than have been in use on the Metropolitan's cars. The wheel height is to be reduced from 33 in. to 30 in. in order to save space and facilitate boarding and alighting.

TRADE NOTES

Lorain Steel Company, Johnstown, Pa., has just received an order from the International Railway, Buffalo, N. Y., for 5300 tons of 9-in. girder rail, No. 124—432.

Electric Controller & Manufacturing Company, Cleveland, Ohio, announces that the O. H. Davidson Equipment Company, Ideal Building, Denver, Colo., will act as its representative in Colorado, Utah, Montana, Wyoming, South Dakota, New Mexico and Arizona.

H. Bortin, formerly engineer in charge of valuation department of Union Pacific Railroad for four years, and member of its valuation committee; lately assistant to general secretary of Presidents' Conference Committee on Federal Valuation of the Railroads, announces his entry into private practice as consulting valuation engineer, with office at 149 Broadway, New York City.

Guy E. Marion, secretary-treasurer of the Special Libraries Association, has resigned from Arthur D. Little, Inc., chemists, engineers and managers, 93 Broad Street, Boston, Mass., where he has been located for the last five years in charge of its information department. Mr. Marion will devote himself to the organization and development of special libraries, or information departments, in business houses, industrial plants, etc.

American Manufacturing Company, Chattanooga, Tenn., of which J. B. Robinson is president, manufacturer of hardware specialties, such as electrically welded wire oven racks, etc., has recently purchased the plant and equipment of the Owensboro Shovel & Tool Company, Owensboro, Ky., of which J. W. McCulloch was president. The equipment has been installed in the Chattanooga manufacturer's plant and will be ready for operation in a few weeks.

Edison Storage Battery Company, Orange, N. J., has appointed Charles E. Poyer as assistant general sales manager. Mr. Poyer has been with the Edison interests for about four years, having served first on the personal engineering staff of Mr. Edison in the development of special application of the alkaline battery, and later as assistant advertising manager. For the past two years he has been manager of the house lighting department.

British Westinghouse Eectric & Manufacturing Company, Ltd., Manchester, England, will purchase the Société Anonyme Westinghouse, Havre, France, and the Societa Italiana Westinghouse, Genoa, Italy. The English company, it is reported, will take over the Continental companies purely as a matter of business policy, and not as an expedient under which to furnish war materials for the Allies. The American company, by virtue of its stock control of the English company, will still control the English company, and through it the French and Italian concerns. The plants in France and Italy will continue to be run separately.

E. P. Roberts, who, since 1912, has been Commissioner of Smoke Abatement at Cleveland, has reopened his office as consulting engineer at Cleveland with temporary headquarters at 2053 East Ninety-sixth Street. Mr. Roberts has had an extended experience as consulting engineer for public service and industrial properties. In the circular which accompanies the announcement in regard to the opening of his office, it is stated that the total amount involved in properties for which Mr. Roberts has been engineer, or for which he has prepared reports, is approximately $175,000,000; the properties for which he has been engineer cost from a few thousand dollars up to $3,500,000, and the properties existing or proposed which he investigated or reported on would cost from a few thousand dollars up to $8,500,000.

ADVERTISING LITERATURE

Eclipse Railway Supply Company, Cleveland, Ohio, has issued a folder describing its trolley retriever.

Ohmer Fare Register Company, Dayton, Ohio, has issued a card which reproduces an editorial which appeared in the Dayton *Daily News* of Dec. 23, 1914, commenting upon the proper relationship between manager and conductor.

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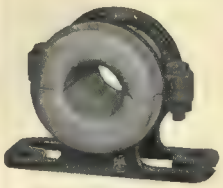
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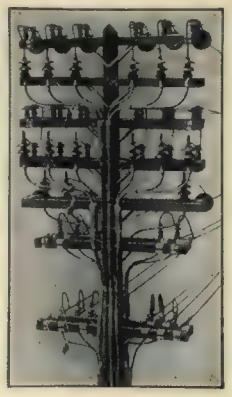
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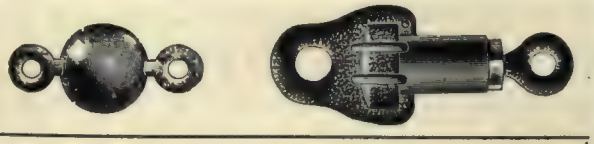
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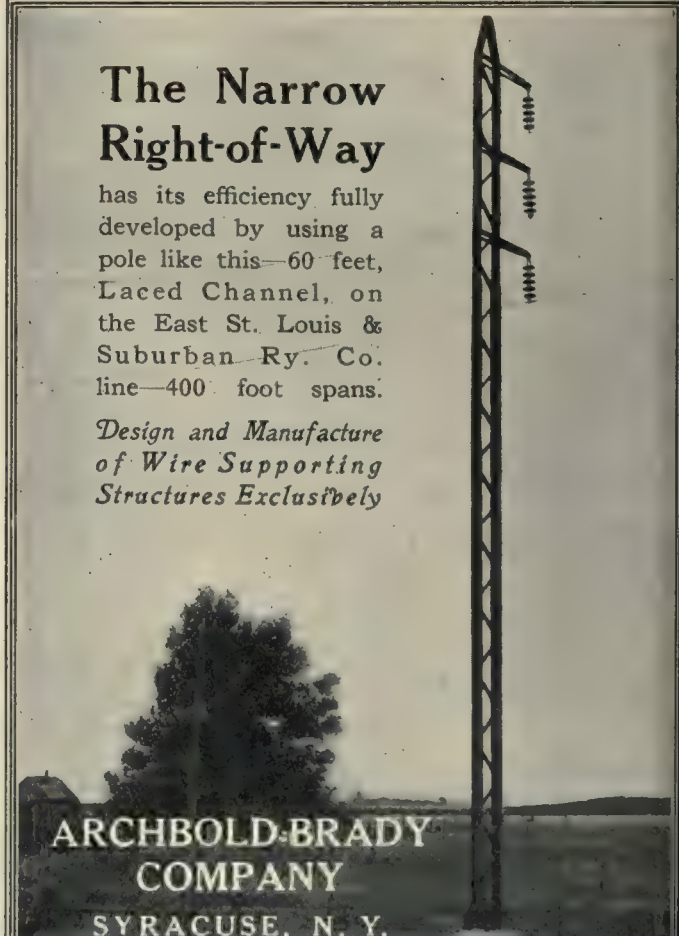
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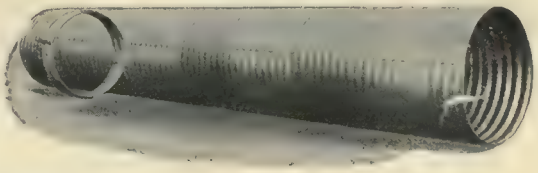
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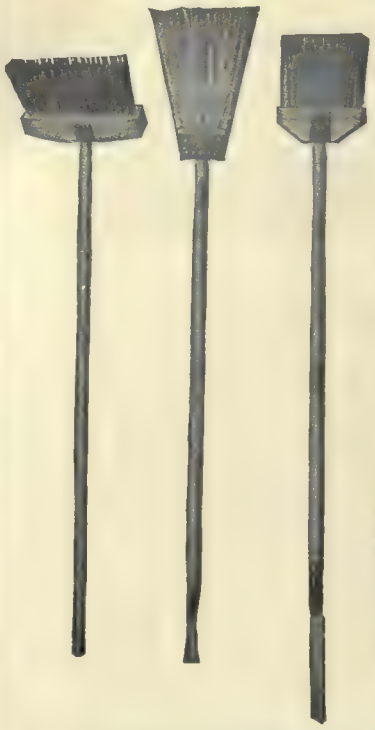
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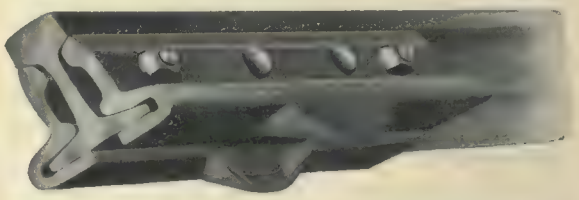
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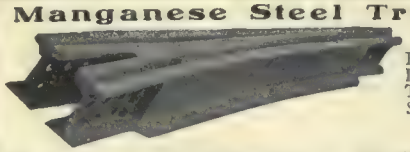
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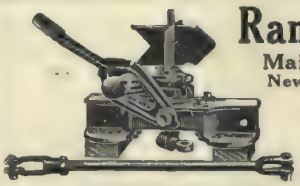
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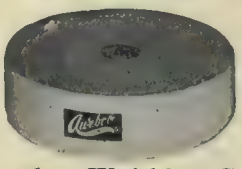
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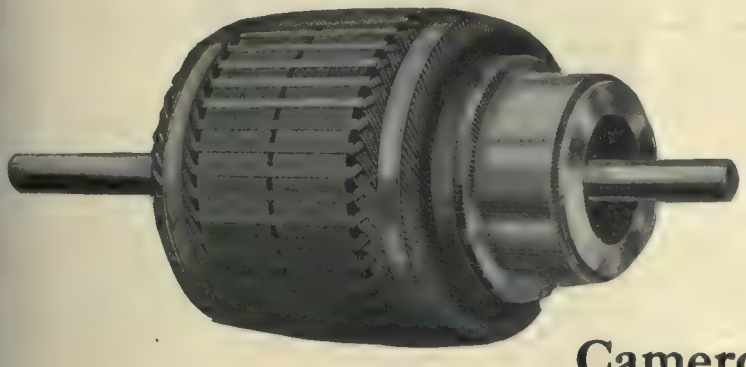
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Music wire springs—
Highest polish—Utmost durability—
Prices the lowest—Ask—
Samples free—Repairs at Cost—
Stowe Ry. Punch Co—Newark, N. J.



This
Represents Cost
of Deltabeston
over Cotton Insulated Wire



This
Represents the
Savings Deltabeston
Effects in the Long Run

Which Will YOU Take?

The above is simply a graphic illustration of the "penny wise, pound foolish" policy of letting price stand in the way of using "DELTABESTON" MAGNET WIRE on your coils. "Deltabeston"—the wire with the tough, *permanently flexible, pure asbestos* insulation—saves coil failures—motor burnouts—stalled cars—rewinding expense. Because "Deltabeston" stands up where ordinary insulation breaks down. That's all. *Proof,* if you ask for it.

D & W FUSE CO.
Providence, R. I.

71826





Get Our
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PUNCHES

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

"For your new cars and old ones, buy The Peter Smith Forced Ventilating Hot Air Heaters, or Hot Water System, from the Originators, who can furnish an acceptable guarantee."

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave. Detroit, Mich.

THE RAILWAY SUPPLY & CURTAIN CO.
CHICAGO
CAR CURTAINS & FIXTURES
FOR ALL PURPOSES
CATALOGUE ON REQUEST

MAKE THE BEST

Ventilation—Sanitation—Economy—Safety
All Combined in
THE COOPER FORCED VENTILATION HOT AIR HEATER
Patented September 30, 1913. Ask for the full story.
We Also Manufacture Pressed Steel Hot Water Heaters
THE COOPER HEATER CO., CARLISLE, PA.

"UTILITY" Electric Thermometer Control
SAVES 70% In Heating Current

"UTILITY" Ventilators Represent the Highest Efficiency—Various types to Meet All Conditions

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SAFETY FIRST



Always ready for use.
Takes both tickets and cash fares.

CLEVELAND FARE BOX CO.
CLEVELAND, OHIO



The
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ASSURES

Full and Complete Fare Collection.

Accurate Registration.

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This Box Is

Well Built—Fool Proof—Tamper Proof. Working Parts Are of Hardened Steel to Insure Long Service at Minimum Upkeep Expense. Registers nickels, pennies and dimes.

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15 South Throop Street CHICAGO, ILL.

Hale & Kilburn
Steel Interior Finish

is the product of the largest works in the world devoted to all-steel car products.
One of the most widely used products is the

H & K
Walkover Seat

used by practically every leading railway because it saves in car weight, power and maintenance.
Specify it.

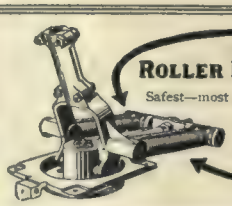


Hale & Kilburn Company
New York
Philadelphia
Chicago

"Watch Your Step"

If it has
Universal Safety Tread
on it
Proceed in Safety.
If Not
Be Careful

Universal Safety Tread Co., Waltham, Mass.
New York Philadelphia Chicago



SIMPLEX
ROLLER BEARING TROLLEY BASE
Safest—most economical. Tension INCREASES as pole goes UP, decreases as pole comes DOWN. No more bent poles or knocked down wires.
Full particulars from
THE TROLLEY SUPPLY CO.
Canton, Ohio



MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.



Eclipse and Acme Fenders Give Immunity from Accident Suits

The function of any fender is to protect the human body from the first impact with car body. That the "Eclipse" does this successfully up to speeds of thirty miles per hour is being demonstrated daily throughout the country.

The Eclipse Trolley Retriever

is designed for any range of service. Retrieves in less than three inches. Compulsory set; weak spring controlled by thumb nut on face of casing. No tools required for winding or adjusting. Fool proof. Furnished with open or closed rope drum. Use knotted rope or ferrule, as preferred. Less parts than any other retriever on market.

Will send sample for trial.



ECLIPSE
RAILWAY SUPPLY CO.
Cleveland, O.

Why Not Buy Trolley Base and Retriever All in One



That's What You Get In

The WASSON
Air-Retrieving
Trolley Base

It performs the double function. It combines the ordinary trolley base with a retrieving mechanism operated by air. It's the "last word," the latest development in the field. It means maximum efficiency in car operation, as far as the trolley can contribute toward it. It means rapid transit without fear of jumping trolleys. It means freedom from damaged or torn down overhead if the trolley should leave the wire. Try it out. If it does not "make good" it costs you nothing. Order one today.

The Wasson Engineering & Supply Co.
Milwaukee, Wis.

The Right Metal in the Right Place

is a big factor in keeping cars in service. Car axles need a bearing metal specially designed *for car axles*—that's Post's "Zero" Metal. Motors need a bearing metal specially designed *for motors*—that's Post's "Motor" Metal. Both are standard with large companies. Post's Metals are guaranteed made of Virgin raw materials only.



For Armature Bearings use Post's "Motor" Metal

E. L. POST & CO., Inc.
Sole Manufacturers
7352 **50 Cliff Street** **New York**



Nichols-Lintern Car Ventilators

will change a car's atmosphere every ten minutes

or in fact, from six to ten times per hour. They are neat and inconspicuous in appearance and maintain constantly a refreshing circulation of pure air at the same time obviating drafts. Improve heat distribution and prevent stuffiness. Write for details.

The Nichols-Lintern Company
Cleveland, Ohio

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729-P

UNION SPRING & MFG. CO.

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Coil and Elliptic
M. C. B. Pressed Steel Journal Box Lids

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Stackpole Carbon Co.

Manufacturers of Motor and Generator Brushes



Metallic and Graphite Brushes
Carbon Specialties

St. Marys, Pa.



This is the man who developed the

ACME TRACTION MOTOR BRUSH

It is a distinctly high grade product — uniform — eliminates wear — Longest life and worthy of your choice if you want the best.

Ask us—

THE NUNGESSER CARBON & BATTERY CO.
Cleveland, Ohio

MEMBER OF SERVICE — THE SOCIETY FOR ELECTRICAL DEVELOPMENT INC. NEW YORK — SAFETY — PROMOTION
"DO IT ELECTRICALLY"



—it's the economical brush!

If you want a brush that will give good credit to your choice —get Speer's type G.
It's a big advance in the brush making art.
Write for samples and data.

Speer Carbon Co., St. Marys, Pa.

3926

"Hard Service"

Railway Motor Gears and Pinions

have for years consistently represented SUPERIORITY, and appeal to the man who considers EFFICIENCY as well as first cost. Supplied in four grades: Standard, Special, Treated, Hardened.

THE VAN DORN & DUTTON CO.
Gear Specialists
CLEVELAND (Sixth City)
NEW YORK LOS ANGELES SAN FRANCISCO

Wheel Condition No. 3

If only the wheel tread needs truing this type of



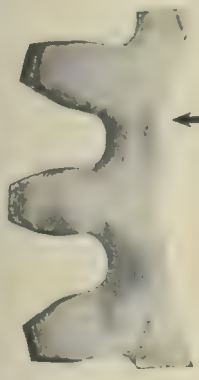
Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe

will solve the difficulty cheaper than any other method and without removing the car from service.

Wheel Truing Brake Shoe Co. Detroit Michigan

A Prominent Ry. Tested "Tool Steel" Pinions vs. Case-Hardened



Here are the results. This is the "Tool Steel" pinion after 170,760 miles, worn .086″ at the pitch line.



This is the case-hardened pinion after 123,351 miles; worn .165″ at the pitch line.

Efficiency 2⅔ to 1 in favor of "Tool Steel." We talk *records* because we believe they mean more than salesman's promises.

The Tool Steel Gear & Pinion Co.
Cincinnati, Ohio

There's a BLISS for every motor —for every service



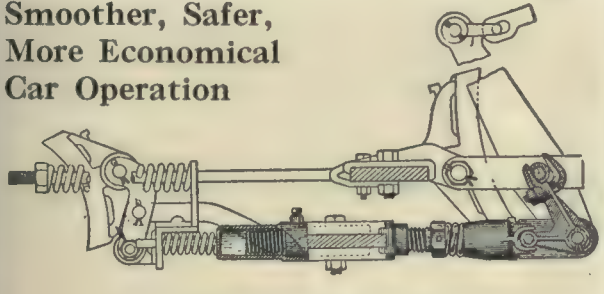
We furnish gears and pinions for every style and size motor in service.

We have a grade for every service condition, each and every grade carries its own guarantee.

Bliss Gears and Pinions

E. W. Bliss Co.
Brooklyn, N. Y.

Smoother, Safer, More Economical Car Operation



results from use of

The ANDERSON
Automatic Slack Adjuster

Increases in mileage of car per year and therefore earning capacity of each car by lengthening time between inspections.

Increases speed of operation by insuring maximum efficiency and positive working of brakes at all times under all conditions.

Decreases labor costs by eliminating the man in the pit.

Write for full description.

Anderson Brake Adjuster Co.
Omaha, Neb.
William R. Garton, Sales Engr., 299 Broadway, N. Y.
Grayson Railway Supply Co., Southwestern Rep., St. Louis, Mo.
3

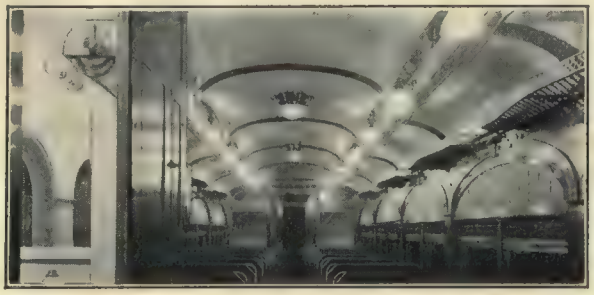
BRAKE SHOES

A Road May be Proud of Its Braking Efficiency

Yet it may be wrong to conclude that the type they used should be on *your* cars. Your operating conditions are probably different. What is profitable for one line may be unsuited to many others. The easiest way to make *sure* of getting maximum braking economy and efficiency for *your* road is to consult specialists. That is our business. Consult us.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71606 3

Edison Non-Acid
Storage Battery Lighting



Night service is made popular by the Edison Battery System



of non-dimming, even illumination which is offered to Street Railway Companies in a Practical Form. Edison Storage Battery Information regarding Car Lighting, Electric Street and Baggage Trucks and Railway Car Power should be in the Data File of every Electric Railway Engineer.

Write For It.

Edison Storage Battery Co.
221 Lakeside Ave., Orange, N. J.

There's No Hidden Weakness in "Jones-Built" Cars

When you specify "Jones-Built" cars you've specified *quality construction* then and there. Specifications aid us in turning out the *type* of car you want, but the quality of workmanship that goes into it varies no whit in all the cars we build.

They're Built on Honor Through and Through

We build cars for electric railways only, but we build them well, and have been doing so since cars for surface railways were introduced. Some of our cars are still in daily operation after a *quarter century* of service. Write for data.

J. M. Jones' Sons Company

Builders of Cars for Electric Railways Exclusively

Established 1839 Incorporated 1911

Watervliet, N. Y.

7183

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Offices, 50 Church Street New York

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CASTINGS
FORGINGS

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Car and Truck Accessories

ELECTRICAL REPRESENTATIVES

Union Spring & Mfg. Co.
Leaf and Coil Springs

MCB Pressed Steel Journal Box Covers

The "Hycap-Exide" Battery

for

STORAGE BATTERY STREET CARS

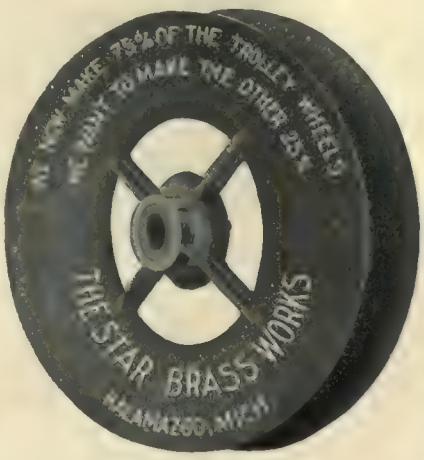
THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

TULC

WE WANT YOUR BUSINESS
IT DOES NOT MATTER
How Large or How Small Your System is
IT DOES NOT MATTER
Whether Your Cars have Old or New Equipment
TULC WILL SHOW A SAVING ON ANY TYPE OF EQUIPMENT IF GIVEN A TRIAL.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

IT has been truly said that "the alloy which may be best for use in Trolley Wheel service may be far from being the best for bearing use" and this is why the



KALAMAZOO Trolley Wheels

are so satisfactory, the rims of which are made of a soft but tough metal having long life without injury to the wire, and the bushing of ***bearing*** metal, a combination impossible in a one-part wheel.

MADE BY

THE STAR BRASS WORKS

Kalamazoo, Mich.

Bayonet Non-Detachable Trolley Harp

Something new, yet tried and true

Made to meet the demands for an inexpensive trolley harp. For those who consider price before the time-saving as well as money-saving features of our well-known detachable harp.

SMOOTH, SYMMETRICAL, LIGHT WEIGHT, NO PROJECTING CORNERS. Its efficiency is only surpassed by our Detachable Trolley Harp.



Largest and heaviest contact washers made. Kept flat against faces of wheel hub by the best contact spring made with uniform tension. Springs most easily attached and they stay attached. Protected from all injury by outside influence.

Any kind of bearing you want—25 styles and sizes to select from, half-inch solid steel to one-inch hollow steel, any way you desire.

Write for discounts and our plain harp circular.

Bayonet Trolley Harp Co., Springfield, Ohio

Eastern Representative:

Wm. R. Garton, Sales Engineer, 299 Broadway, New York City, N. Y.



This Index Prevents Destination Display Errors

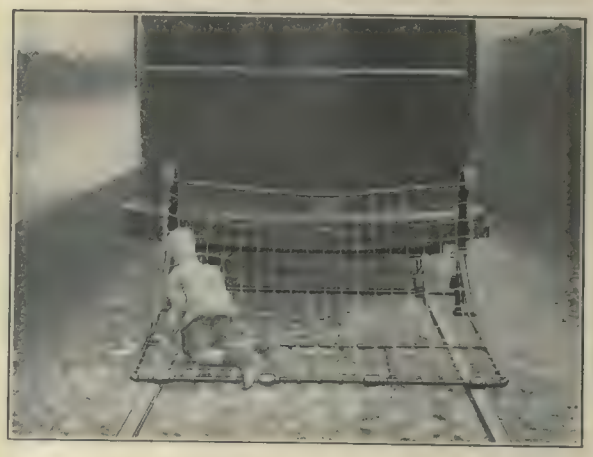
Many a passenger has been subjected to an irksome wait because the car he should have taken passed him with an incorrect destination display. Had a proper **destination index** been provided even the dullest motorman or conductor could make no such annoying error. That's one strong reason why you need

THE CREAGHEAD DAY AND NIGHT CAR SIGN

But the **index** is not the only advantage of the Creaghead. The handy crank arrangement means quick change of display—no time is lost. And the Creaghead never sticks—always works easily and freely, yet keeps the display tight and taut at all times. Lettering is always kept clean and legible—it shines out clear and distinct night and day. An illegible sign is worse than none. To insure good sign service inquire about the Creaghead. Write now.

Creaghead Engineering Co.
Cincinnati, Ohio

71403



Quadruple Protection

—four operating movements—every one **positive** in action—is the multiple safeguard that saves life and limb to the public and dollars and cents to the electric railway that adopts

PARMENTER FENDERS

Parmenter Fenders not only scoop up man, woman or child with automatic precision, but also provide perfect protection against the shock of collision and the dangerous rebound following.

Write for details of the 1914 model with the yielding and locking apron.

Parmenter Fender & Wheel Guard Co.
89 State St., Boston, Mass.

71573



Five Economy Factors
in the
Universal Trolley Wheel

WHEEL—never needs lubrication. Big grease pockets keep it permanently supplied. These last as long as the wheel contact metal, and that gives twice the service of ordinary wheels.

PIN—with patented interlocking grease pockets that regulate the lubrication. A time and money saver in any wheel, but doubly efficient when combined with the Universal.

BUSHING—improved hard bronze that presents a wide bearing surface and prolongs its life. Slotted to feed the lubricant.

CONTACT METAL—composition proven by test the best to resist wear. Easily replaced when worn.

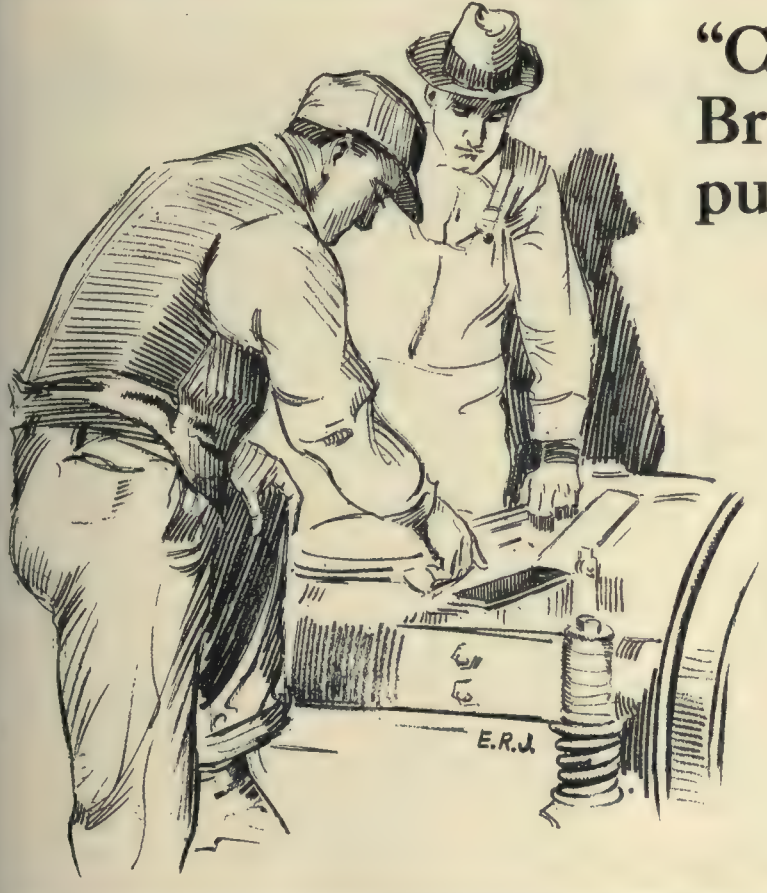
CONTACT SPRING—maintains perfect contact. Detachable in seven seconds without removing the pole from the car.

THE PRICE makes you wonder why you never investigated the Universal before.

Write for the full data.

The Universal Trolley Wheel Co., Northampton, Mass.

9483 **Automatic Ventilator Co., Sales Agent, 2 Rector St., New York**



"Change those Brushes— put on Le Carbone"

A command like that will do more to

—cut shop costs

—cut commutator costs

—cut brush costs

—improve service,

than any other single thing that can be done.

Do it now.

W. J. Jeandron
173 Fulton Street
New York



Double Skin Compromise Arch Type.

Most modern types of cars are equipped with

PERRY VENTILATORS

Over fifty thousand in operation

—They ventilate—

Special designs for Arch or Compromise Arch Roofs, eliminating all ungainly projections by methods impossible to other devices.

PERRY VENTILATOR CO.

NEW BEDFORD, MASS.

Sales Manager: F. C. Stowell, 200 Devonshire St., Boston, Mass.



What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

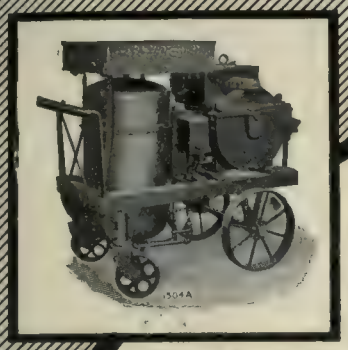
A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It



National HIGH EFFICIENCY

Portable Air Compressors

equipped with electric or gas motor drive.

For electric power house, repair shop and construction work

Built in capacities ranging from 11 to 300 cu. ft. of free air per minute.

Twenty-Five Types To Select From

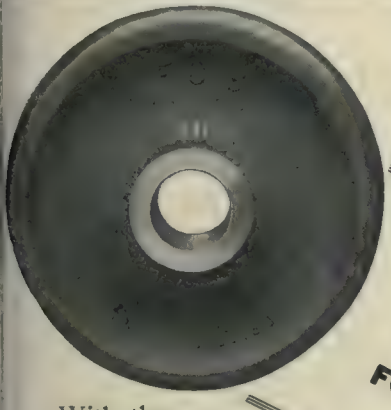
These outfits will be found most efficient and economical where the floor space is limited or the nature of the work requires that a supply of air be delivered in different places and under constantly changing conditions ***because*** they can be easily moved from place to place. They eliminate the necessity of extensive piping.

National Portable Outfits with Gas Motor Drive are especially adapted for construction work or where electric power is not immediately available.

Catalog E-400 illustrates and describes these outfits together with many other types of National Air Compressors. You ought to have a copy. Better write for one today.

National Brake & Electric Co.
Works at Milwaukee, Wis.

SALES OFFICES
New York.....165 Broadway
Chicago.....827 Railway Exchange
St. Louis.....318 Security Building
Pittsburgh.....Ninth and Penn Avenue
London, England.....14 Great Smith Street



Guaranteed Mileage

F. C. S. Wheels

FOR ALL CLASSES OF SERVICE

With the uncertainties of traffic conditions, rolling stock, loads and trackage it might be considered a risk to guarantee wheel mileage.

Knowing the composition and actual results in service of F. C. S. Wheels, however, we do not hesitate to give users an iron-clad guarantee of wheel mileage and to protect the user in each case against deficient mileage (should such occur) by either a cash allowance or wheel replacements.

Aren't F. C. S. Wheels worth investigating if we will do *this?*

For safety and economy specify the F. C. S. Wheel.



Griffin Wheel Company

PLANTS—Chicago, Detroit, Denver, Los Angeles, St. Paul, Tacoma, Kansas City, Boston

3



Standard Trucks

For Safe, Long-time Service

Opposite is shown our Standard O-50 "SHORT WHEEL BASE" DOUBLE TRUCK.

Frames solid forged without welds, i. e., made from one continuous bar of open-hearth steel. Carrying capacity 50,000 pounds at king pins, 34" Forged Steel wheels, 3¾ x 7" M.C.B. journals. Brake shoes hung on the equalizer bars (thus insuring uniform wearing of brake shoes). All wearing holes steel-thimbled and bolts case-hardened. This truck is used throughout the New England cities, New York, Detroit, Toledo, Oklahoma City, Seattle, Jacksonville, Kansas City, San Francisco, Cincinnati, Indianapolis and many other cities.

Our STANDARD C-60-P "INTERBOROUGH" DOUBLE TRUCK is ideal for high-speed "Interborough" service. Carrying capacity 60,000 pounds at king pins. Pressed steel channel side frames, end frames and transoms. Brake shoes hung on the equalizer bars. All wearing holes steel-thimbled and bolts case-hardened, 36" Forged Steel wheels, M.C.B. journals 4¼ x 8". These trucks are in service in the following cities:—Cincinnati, Detroit, Pittsburgh, Youngstown, Vancouver, Seattle, Oklahoma City and other cities. Can be safely operated at a speed of 60 to 70 miles per hour.

We make Standard Trucks for all kinds of electric railway service.

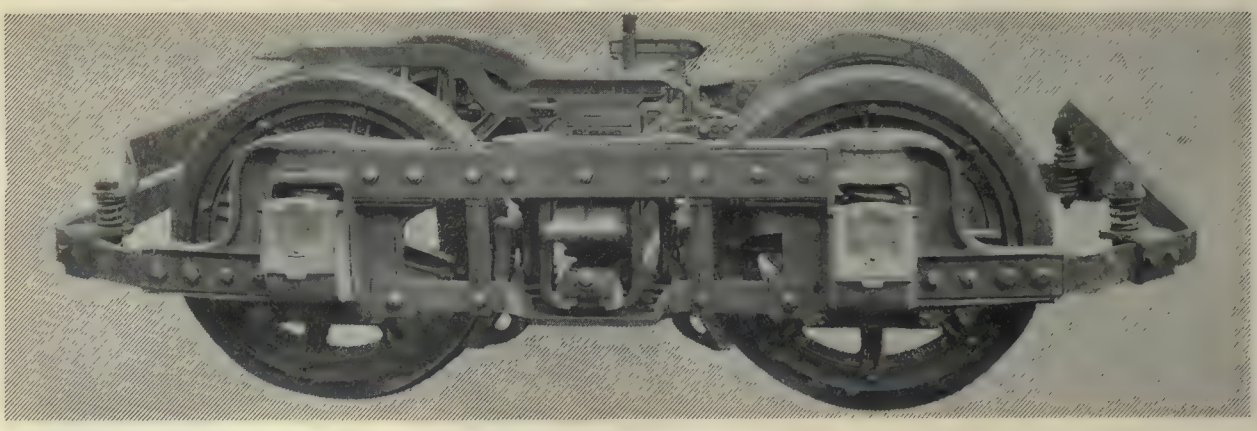
STANDARD MOTOR TRUCK COMPANY, Frick Bldg., PITTSBURGH, PENN.

New York Office: 170 Broadway. Works: New Castle, Pa. Chicago Office: Fisher Building

Pacific Coast Agents: Eccles & Smith Co., Inc. Offices, San Francisco, Cal.; Los Angeles, Cal.; Portland, Ore. 2

"Taylor-Made" Trucks

Simplicity of Construction—Low Cost of Maintenance—Ease of Riding



Taylor Improved S. B. Truck for City and Interurban Service

To obtain the latest developments in truck design and construction, SPECIFY TAYLOR TRUCKS. They have interchangeable wearing parts and many other TAYLOR advantages which you should know.

Write for Truck Photos and data.

We also manufacture T.M.C. Steel Tired Wheels and "TAYLOR-MADE" Elliptic and Coil Springs for every make of truck.

TAYLOR ELECTRIC TRUCK CO.

Established 1892

Main Office and Works: TROY, N. Y.

TROY, N. Y.

CHICAGO OFFICE: First National Bank Bldg.

THE "STANDARD" BRAND ON YOUR MATERIAL IS AN ASSURANCE OF EVENTUAL ECONOMY



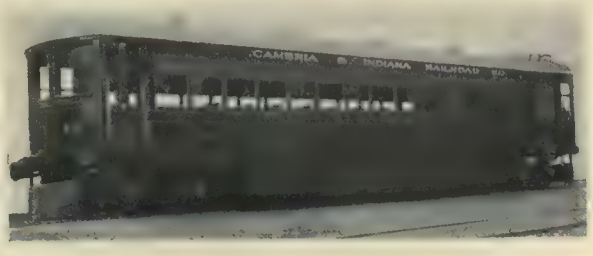
STANDARD STEEL WORKS CO.

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Denver, Colo.
San Francisco, Cal.
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St. Louis, Mo.

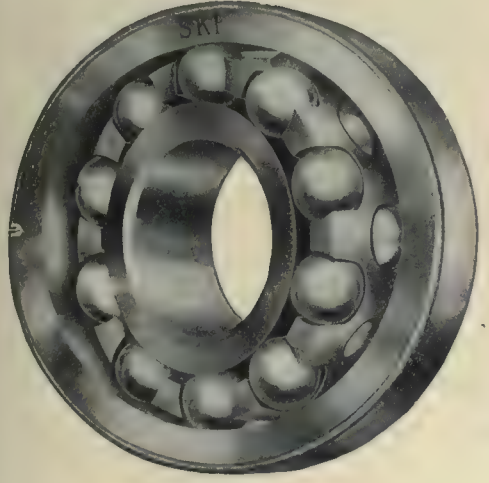
MORRIS BUILDING
PHILADELPHIA

Chicago, Ill.
New York, N. Y.
Richmond, Va.
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Pittsburgh, Pa.

SKF BALL BEARINGS for



Electrical equipment supplied by the Railway Storage Battery Car Co. Car body built by the J. G. Brill Co.



Type of Bearing Used on Above Car—Deflected Position

Cambria & Indiana Railway Storage Battery Car

S K F Ball Bearings again demonstrate their superiority by their selection for service on the new storage battery car operated by the Cambria & Indiana Railway.

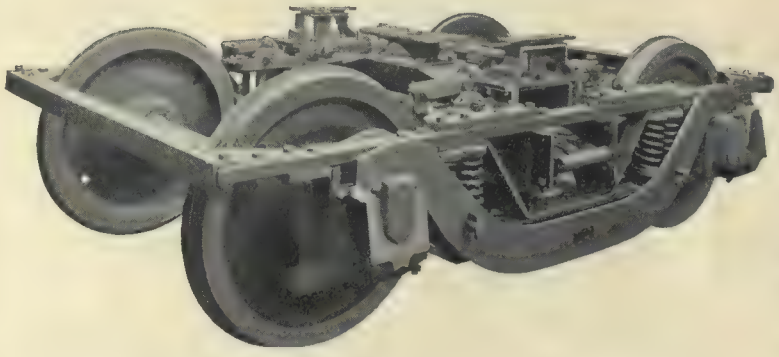
In no type of car is the question of bearings more vitally important than in storage battery car service. The efficiency of S K F Bearings contributes materially to the high speed and exceptionally long range per battery charge possible to the above car. Write for figures on S K F economy in the above and similar services.

SKF BALL BEARING CO. 50 Church Street New York City

7108-P

The basic idea in designing railway equipment should be

SAFETY FIRST



To insure this feature in **Baldwin Trucks**, a stress diagram is made, and the principal parts are figured for strength and deflection, allowing the proper **factor of safety.** The calculations are corroborated by years of practical experience.

A safety first feature of Baldwin trucks is the brake work. The parts are bolted instead of pinned together; a sure preventive of their working loose and falling on the track.

BALDWIN TRUCKS stand for **"SAFETY FIRST."**

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

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A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.
J. A. Hanna, Niles, Ohio



New End-Entrance Car built for the Stark Electric Railroad

The novel idea of placing the door-location at the end of the above car to facilitate prepayment renders this example of Jewett construction of special interest. Let us furnish estimates on *your* specifications.

The Jewett Car Company

Newark, Ohio

71698

Your Own Electric Railway Journal

THESE are the advantages of being a personal subscriber for the Journal: **You receive your own copy of the paper each week. You have it to read when you want it and as long as you want it. You can keep your own file of the paper for reference.**

If you are **not** a regular subscriber, you probably see the Journal from time to time. **But,** are there not times—and many of them—when you want to read the latest issue and some one else has it? Are there not many other times when you want to refer to an article in a back number but cannot find that number?

For less than 6 cents a week you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have a constantly growing library of your own on all branches of electric railroading.

You will never miss the subscription price, but you will miss a lot of things if you do not get the Journal.

Better send your order to-day before it is forgotten

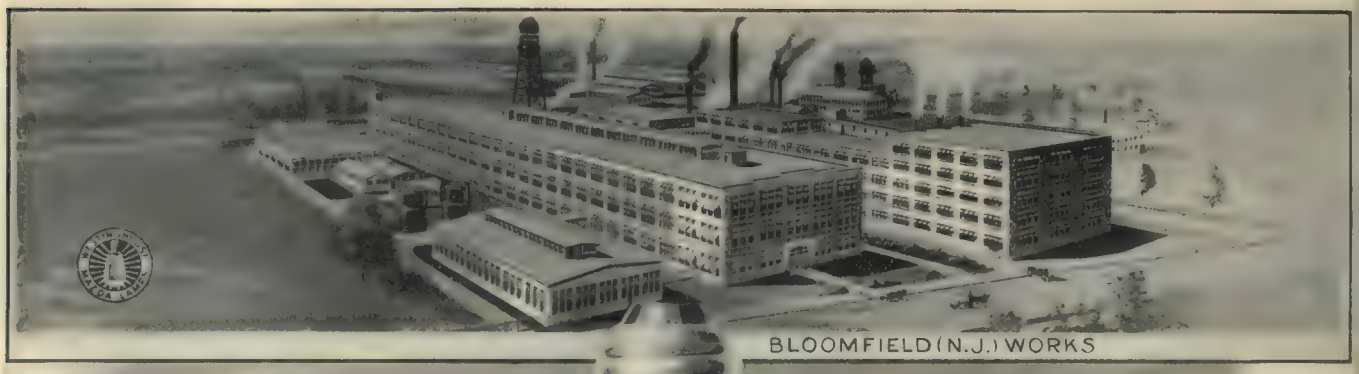
COUPON

Name

Position and Company

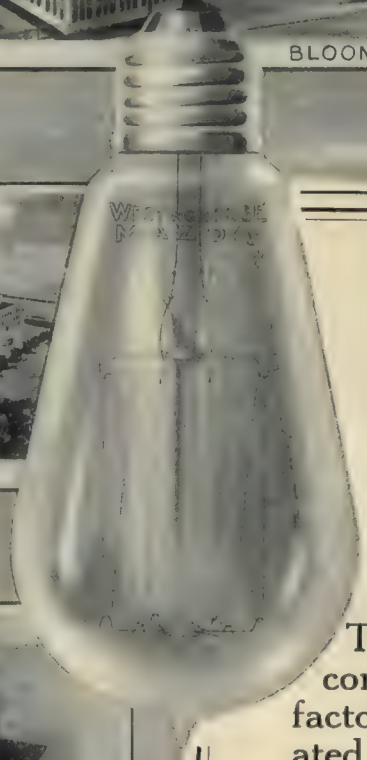
Address

Electric Railway Journal, 239 W. 39th St., New York, N. Y.


BLOOMFIELD (N.J.) WORKS


MILWAUKEE (WIS.) WORKS


NEW YORK (N.Y.) WORKS



Westinghouse Mazda Lamps Are Made in Westinghouse Factories

Three modern up-to-date completely equipped lamp factories—owned and operated by the Westinghouse Lamp Company—manufacture the millions of Westinghouse Mazda lamps used each year in the United States.

The enormous output of these plants enables us to offer you the best of service on lamp deliveries.

Our large experimental laboratories give us the ability to **set**—not merely **keep**—the pace in the rapid developments in lamp manufacture.

When you sign a contract for Westinghouse Mazda lamps you get satisfactory lamps and satisfactory service.

The name "Westinghouse" is your guarantee.

Westinghouse Lamp Company

Atlanta	Los Angeles
Baltimore	Memphis
Boston	New Orleans
Buffalo	New York
Butte	Philadelphia
Chicago	Pittsburgh
Cincinnati	Portland
Cleveland	St. Louis
Dallas	Salt Lake City
Denver	San Francisco
Detroit	Seattle
Kansas City	Syracuse

Member Society for Electrical Development. "Do It Electrically."



A Complete Sign

You can get most any type of Keystone Car Destination Sign—types for installation in boxes built in as a permanent part of the car; types for installation in side monitor windows, above doors in center-entrance cars, side windows, vestibule windows, on the surface of the deck, hood signs, route signs, and signs to meet many more conditions, regular or special, signs to be illuminated or otherwise. The line of Keystone Car Destination Signs is complete.

The illustrations above show front and rear views of standard Type I signs, well adapted for installation in side vestibule windows; a glazed sign, installed in a weatherproof steel box, illuminated, and having the well-known Keystone advantages of one piece curtain, removable curtain and mechanism, positive gear, and clutch drive, centering and destination indicators and many more.

This type and many others are yours for the solving of your sign problems in the best, most efficient and cheapest manner.

Tell us the conditions you have to face and let us recommend the Keystone Destination Sign that will best fill them—all without obligation on your part.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

It Picks Them Up Instead of Crushing Them Under!

FONGER Tip-Tilting Automatic Fender

Observe the photos.

No. 1 shows child, unconscious of danger, crossing track in front of car.

No. 2 shows overturnable shield automatically tripped by contact with child's body and thereby instantly filling the space between fender and street surface, making it impossible for child to become wedged beneath fender.

No. 3 shows shield completely tripped, "scooping up" the child.

No. 4 shows the child safely landed in basket of fender.

One of the decided advantages of the Fonger Fender is the manner in which it prevents a person being caught under it. The tip-tilting or overturnable shield guards against this by automatically and instantly tipping back and dropping to street, thereby "scooping up" the person struck.

By depressing a plunger with his foot, motorman may quickly swing fender back under car in order to avoid contact with wagons or other obstructions.

In normal running position, fender projects but 2 feet ahead of car, as shown in photo No. 1.

Trial set of these fenders sent on request free of charge and fitted to any type of car.

Fonger Fender Company

3852 Cottage Grove Ave. CHICAGO, ILL.











FABRIKOID
for Seat Covering and Curtains

on new cars of

Altoona & Logan Valley Electric Ry.

DU PONT FABRIKOID
REG. U. S. PAT. OFF.

the tough, weather-proof Curtain Material

the non-splitting, non-peeling, Seat Covering

Fabrikoid is absolutely impervious to moisture; it can be easily and perfectly cleaned with soap and water. Dirt does not cling to it as to woven surfaces. Fabrikoid is *more sanitary*. It is extremely durable, does not crack or peel, yet is very pliable and easily applied. It is economical—in *first cost* as well as maintenance. Use it for curtains and seating. Fabrikoid saves money and betters service. Made in many weights, widths, patterns and colors. Write for samples and prices.

DUPONT FABRIKOID COMPANY

Dupont Building, Wilmington, Del.

Railroad Dept. Representatives:

WENDELL & MacDUFFIE COMPANY

63 BROADWAY, NEW YORK

7122



Chilled Iron Street Car Wheels

The fact that 97 per cent of all our freight cars in this country are equipped with Chilled Iron Wheels is convincing proof of their superiority.

The Chilled Iron Wheel is a single service wheel and in STREET CAR SERVICE is superior to other types because of the harmony of its structure with the parts with which it comes in contact, such as brake shoe and rail.

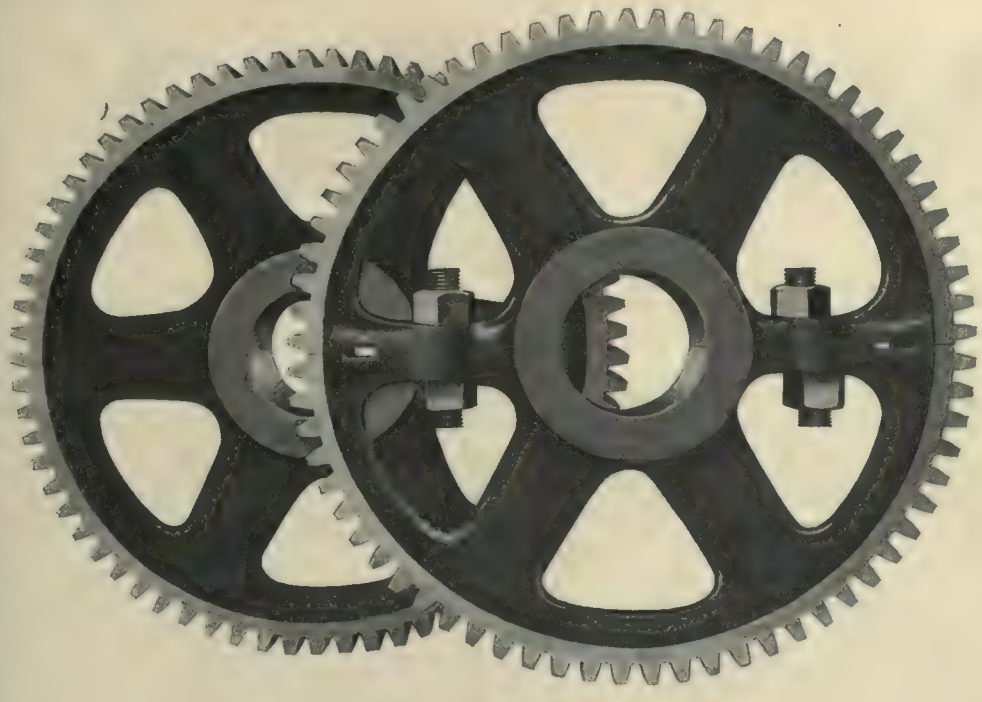
No cutting action in Chilled Iron Wheels on the rail or brake shoe which is common in other types; therefore the rail lasts longer, the brake shoes yield 25 to 50 per cent more service and there is 10 per cent less power required.

The Wonderful Single Service Chilled Iron Car Wheel

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

1214 McCormick Building, Chicago

Representing forty-eight wheel foundries throughout the United States and Canada.
Capacity 20,000 Chilled Iron Wheels per day.



Six Spoke
Gears

6-SPOKE GEARS for railway motor service have greatly eliminated the inherent defects in cast steel gears.

The spokes are elliptical in section, and so proportioned as to reduce shrinkage stresses to a minimum.

These gears can be furnished either split or solid in any grade previously supplied in four-spoke gears.

Address Dept. E

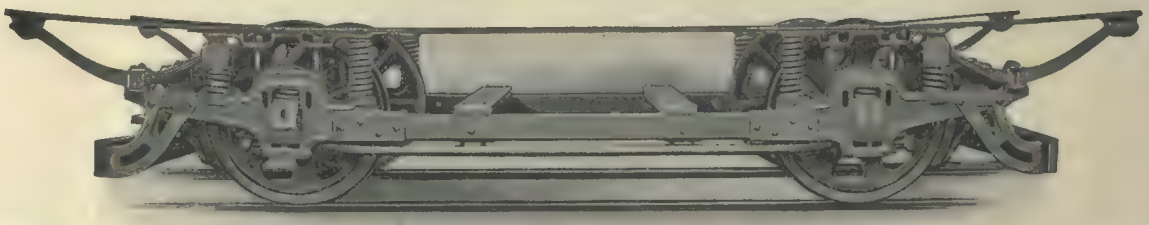
Nuttall
Pittsburgh
Made in U. S. A.

BEMIS TRUX

Built in a NEW Plant

The Product of New and Improved Facilities

THE BEMIS STANDARD SINGLE TRUCK



Easy Running

Built Any Wheel Base

Steel Yokes or Pedestals, Either Regular Bemis Standard Brakes, or Special Non-Chattering Adjustable Brakes.
Also Standard Heads. All parts drilled and Machined in Jigs.
All parts Interchangeable.

The Best Brake Pins on the Market



TEST WITH HAMMER, SAW, FILE OR CHISEL.

Compare with any other pins.
We cannot suffer by comparison.

BEMIS CAR TRUCK CO., SPRINGFIELD, MASS.

NILES

"Commercial Shape" Steel Construction



As practiced in large oil-electric battery self-propelled cars for steam railroad branch lines and fast interurbans.

Continuous steel center sills should be used in all cars subject to buffing and drawbar stresses of train service and for protection against telescoping in collisions. Center sills are omitted from Niles cars only when for single unit service exclusively.

The diamond rolled steel floor is for engine and baggage rooms only. Steel and Flexolith floors will be used in passenger compartments.

Continuous steel angle top plates are better than continuous posts and carlines as they provide better upper members for the girder sides.

Roof will be entirely of steel with sheets fastened to carlines outside and inside with 3" air space between. The channel flanges provide better body of steel for rivets than thin special pressings and have the webs punched out.

Over 5 tons of electric batteries are carried on special trusses under car, independent of body frame.



There are absolutely no special pressings or forgings in this car. It can be repaired or replaced from warehouse stock by your own mechanics with ordinary tools.

NILES

Car and Mfg. Co.

NILES, OHIO

SAFETY FIRST

A Collision —The Result

Running at full speed (60 miles an hour) Coach No. 25 ran smack into Traction Engine stalled on the tracks. What happened is most convincingly told in the accompanying illustrations.



THE COACH. Not a Passenger Injured. Damage to Coach Infinitesimal.



THE ENGINE.

Most gratifying to the Designer and to the Builder of the 61-ft. Steel Coach.

SAFETY FIRST

ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:
WENDELL & MACDUFFIE CO.
61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

CAR DATA AND DETAIL TABLE

Advertisers' Statistical Section

THIS section constitutes a collective advertising plan on new lines, participated in by the following manufacturers who availed themselves of this opportunity to advertise their 1914 sales of cars and car equipment.

NAME	ABBREVIATION OR TRADE NAME
Auto Utilities Mfg. Co.	Peerless
Brill Co., The J. G.	American Brill Kuhlman Wason
Cincinnati Car Co.	Cin. Car
Consolidated Car Fender Co.	H-B Prov.
Consolidated Car-Heating Co.	Consol.
Curtain Supply Co.	Cur. S. Co.
Edwards Co., The O. M.	Edwards
Esterline Co., The	Esterline
Johnson Fare Box Co.	Johnson
Lord Mfg. Co.	Lord Earll
National Brake Co.	N. B. Co.
New Haven Trolley Supply Co.	Sterling
Ohio Brass Co.	O-B Co.
Ohmer Fare Register Co.	Ohmer
Prepayment Car Sales Co.	P. C. S. Co.
Railway Improvement Co.	Rico
Railway Roller Bearing Co.	Rollway
Sauvage-Ward Brake Co.	S-W-B
Southern Car Co.	Southern
Thayer & Co., Inc.	Chil'wth.

The table on the succeeding pages is based on information furnished by the advertisers in this section.

Table of Advertisers in this Section whose eq

Purchaser	No.	General Type	Motor or Trailer	Length of Car Body	City or Int.	All-steel, Semi-steel or Wood	Body	Pre-payment	Door Op. Mech.	Compressor Air Cleaners	Brake Hand
Albany Southern R. R.	2	Ps. Clsd	Motor	30- 6	Int.	Semi-steel.	Brill				N.B.C
	1	Express	Motor		Int.	Semi-steel.	Wason				
Allentown & Reading Trac. Co	1	Car									
Altoona & Logan Valley El. Ry	5	Ps. Clsd	Motor	28- 0	City	Semi-steel.	Brill	PCSCo.	PCSCo.		
	4	Ps. Clsd	Motor	32- 6	Int.	Semi-steel.	Brill				
Androscoggin Elec. Co	1	Snow Plow		30- 0	Int.	Semi-steel.					
Arkansas Northwestern R. R.	1	Gasoline Mech. Drive		70- 0	Int.	All-steel					
Arkansas Valley Int. Ry	1	Ps. Clsd	Motor	30- 0	City	Wood					
Atlantic Shore Line Ry	2	Ps. Conv	Motor	30- 8	City	Semi-steel.	Wason				
Bartlesville Int. Ry	1	Ps. Clsd	Motor	21- 0	City	Semi-steel.					
Batavia Traction Co	2	Ps. Clsd	Motor	21- 0	City	Semi-steel.	Kuhlman				
Bay State St. Ry	1	Ps. Conv	Motor	30- 0	City	Semi-steel.				Lord	
Biddeford & Saco R. R.	1	Snow Plow									
Binghamton Ry	1	Ps. Conv	Motor		City						
Birmingham-Tuscaloosa Ry	1	El. Loco	Motor	30- 0							
Boston Elevated Ry	100	Pass	Trail		City	Semi-steel.	Brill		Consol		N.B.C
	3	2-Way Dump		24-10½	City	Steel					
	1	Snow Plow	Motor	31- 6½	City	Wood	Wason				
	1	Snow Plow	Motor	30- 0	City	Wood					
	2	Sweeper	Motor	27- 0	City	Wood					
Brantford Municipal Ry	6	Ps. Clsd	Motor	21- 0	City	Semi-steel.					N.B.C
	1	Express	Motor	45- 0	City	Wood					
Bridgeton & Millville Tr. Co	1	Ps. Clsd	Motor	29- 6	City	Semi-steel.	Brill				
Brit. Columbia Elec. Ry	10	Ps. Clsd	Motor		City						
	1	Ps. Exp	Motor		Int.						
Bryan & Cent. Texas Int. R. R.	2	Gasoline		52- 4	Int.	All-steel					
Bryan & College Int. Ry	1	Ps. Clsd	Motor	45- 0	Int.	Semi-steel.	American				
Buffalo & Depew Ry	2	Snow Plow									
Buff. & Williamsville El. Ry	2	Ps. Clsd	Motor	41-10	City	Semi-steel.	Kuhlman	PCSCo.	PCSCo.		
Butte, Anaconda & Pac. Ry	4	El. Loco	Motor	80-Ton	Int.						
	3	El. Loco	Motor	40-Ton	Int.						
Butler County R. R	1	Gasoline Mech. Drive		55- 0	Int.	All-steel					
Butte Elec. Ry	6	Ps. Clsd	Motor	41-10	City	All-steel					N.B.C
Calgary Municipal Ry	1	Sprinkler			City	Steel					
Cambria & Indiana Ry	1	St. Bat	Motor	44- 4	Int.	Semi-steel.	Brill				
Canadian Northern R. R. (Montreal Tunnel & Ter.)	8	Ps. Clsd	Motor	67- 7	Sub	All-steel					
	6	El. Loco	Motor	83-Ton	Sub						
Carolina Trac. Co	2	St. Bat	Motor	18- 0	City	Semi-steel.	Brill				
Cedar Rap. & Marion City Ry	10	Ps. Clsd	Motor	44- 8	City	Semi-steel.					
Centerville, Albia & So. Ry	2	Ps. Clsd	Motor	47- 0	Int.	Semi-steel.	American				
	1	Express		41- 0	Int.	Semi-steel.	American				
Central Ill. Trac. Co	2	Ps. Clsd	Motor	48- 0	Int.	Semi-steel.					
Central of Florida Ry	2	St. Bat	Motor	32- 0	Int.						
	1	Express	Trail								
Central N. Y. Southern R. R.	2	Gasoline, Mech. Drive		70- 0	Int.	All-steel					Lord
Central Passenger Ry	3	Ps. Clsd	Motor	21- 0	City	Wood					
Charleston Inter. R. R.	12	Ps. Clsd	Motor	30- 0	City	All-steel	Cin. Car				
Charlottesville & Albemarle Ry	7	Ps. Clsd	Motor	21- 0	City	Semi-steel.					
Chattanooga Trac. Co	2	Ps. & Bag	Motor	44- 4	Int.	Semi-steel.	Brill				
	5	Flat		32- 0							
	1	Work		35- 0		Steel					
Chicago & Joliet Elec. Ry	5	Ps. Clsd	Motor	36- 0	Int.	Semi-steel.					N.B.C
Chicago & West Towns Ry	10	Ps. Clsd	Motor	44- 6	City	Semi-steel.					
Chicago Elevated Rys	62	Ps. Clsd	Motor	37-10	City	All-steel	Cin. Car				
	66	Ps. Clsd	Trail	37-10	City	All-steel	Cin. Car				
Chicago Great Western R. R	1	Gasoline Mech. Drive			Int.	All-steel					
Chicago, Milwaukee & St. Paul R. R.	12	El. Loco	Motor	260-Ton							
Chicago Surface Lines	228	Ps. Clsd	Motor	32- 8	City	Semi-steel.	Brill				N.B.C
City Ry. Co. (Dayton)	20	Pass	Motor	29- 0	City	Steel	Cin. Car				
Cleveland, Painesville & Ea. R. R.	1	Pass		37-10½	Int.	Wood					
Cleveland Ry	200	Ps. Clsd	Motor	51- 0	City	Semi-steel.	Kuhlman		Consol		
	2	Sweeper									
	8	Dump	Motor			Steel					
	1	Crane									
	12	Yd. Loco									
Cleveland, Southw. & Col. Ry	4	Dump				Wood					
Columbus, Del. & Marion Ry	1	Flat		32- 0	Int.	Wood					
	1	Work		32- 0	Int.	Wood					
Columbus Ry., Lt. & Pwr. Co	1	Snow Plow	Motor	40- 0	City	Wood	Kuhlman				
	2	Sweeper	Motor	40- 0	City	Wood	Kuhlman				
Conestoga Traction Co	1	Ps. Clsd	Motor	33- 6	City	Semi-steel	Cin. Car	PCSCo.		Lord	N.B.C
	2	Ps. Clsd	Motor	28- 0	City	Semi-steel.	Cin. Car	PCSCo.			N.B.C
	1	Work									
Connecticut Co	10	3-Comp. Dump		39- 9	Both	Semi-steel.	Wason				N.B.C
	10	4-Comp. Dump		25- 8½	Both	Semi-steel.					
	2	El. Loco		25-Ton							
Corpus Christi St. & Int. Ry	2	Ps. Clsd	Motor	21- 6	Int.		Cin. Car				Lord
Cumb. & Westernport El. Ry	1	Ps. Clsd	Motor	34- 3	Int.	Semi-steel.	Brill				N.B.C
Cushing Traction Co	1	El. Loco		50-Ton	Int.						
Dallas Consol. St. Ry	15	Ps. Clsd	Motor	26- 6	City	Semi-steel.	American				N.B.C
Danville Trac. & Pwr. Co	2	Ps. Clsd	Motor	43- 0	City	All-steel	Southern				
Dayton & Troy Elec. Ry	4	Box Ft.		47- 6	Int.	Wood					
Dayton, Springfield & Xenia Ry	3	Ps. Clsd	Motor	29- 0	Int.	Steel	Cin. Car				
Dayton Street Ry	5	Ps. Clsd	Motor	29- 0	City	All-steel	Cin. Car				
Denver Tramway	6	Ps. Clsd	Trail	40- 8	City	Wood					N.B.C
	4	Sweeper		28- 3	City	Semi-steel.					
Des Moines City Ry	1	Sweeper		39- 2	City	Semi-steel.					
Detroit United Ry	5	Express	Trail	50- 0	Int.	Semi-steel.					N.B.C
	1	Sw. Loco	Motor	31- 1½	City						
East Liverpool Trac. & Lt. Co	4	Ps. Clsd	Motor	32- 0	City	Steel					N.B.C
Easton Transit Co	1	Ps. Conv	Motor	30- 8	Int.	Steel	Brill	PCSCo.	PCSCo.		N.B.C
	9	Ps. Clsd	Motor	20- 8	City	Semi-steel.	Brill				N.B.C
	1	Sweeper		23- 8	Int.	Wood					
	1	Work		41- 8	Both	Steel					
El Paso Elec. Ry	6	Ps. Clsd	Motor	29- 0	City	Semi-steel.					N.B.C
Elec. Short Line Ry	14	Pass	Trail	60- 0	Int.						
	2	Gas-electric	Motor	71- 0	Int.	All-steel					
	28	Flat									
Elmira Water, Lt. & R. R. Co	1	Ps. Conv	Motor		Int.	Steel		PCSCo.	PCSCo.		Lord
	2	Gondola				Wood					
	1	Work		22- 0		Semi-steel.					
	1	El. Loco									
Empire United Rys	12	Ps. Clsd	Motor	26- 0	City	Semi-steel.		PCSCo.	PCSCo.		N.B.C
	12	Ps. Clsd	Motor		City			PCSCo.	PCSCo.		N.B.C
	5	Freight	Motor		Int.	Wood	Kuhlman				
Ephrata & Lebanon St. Ry	3	Ps. Clsd	Motor	41- 6	Sub	All-steel	Cin. Car				N.B.C
	3	Ps. & Bag		43- 0	Sub	All-steel	Cin. Car				
	1	Bag. & Ex		40- 0		Wood	Cin. Car				
Escanaba Trac. Co	1	Ps. Clsd	Motor	31- 6	City	Semi-steel.					N.B.C
Evanston Ry	12	Ps. Clsd	Motor	28- 0	City	All-steel					N.B.C

...ent was supplied for cars ordered during 1914

Thermo-stats	Window Fixtures	Fare Boxes	Regis-ters	Sanitary Straps	Electric Car Signals	Coup-lers	Fenders and Whlg ds	Head-lights	Air Sanders	Trolley Catch's	Venti-lators	Slack Adj't'rs	Anti-Climb-ers	Trolley Bases	Ball or Roller Bearings	Trap Doors	Gear Cases
							Prov.		O-B. Co.	Earll				O-B Co.			
	Edwards		Ohmer	Rico	Consol		H-B	Esterline									
	Edwards		Ohmer		Consol		H-B	Esterline	O-B Co.	O-B Co.	Peerless	S-W-B	Rico				
												S-W-B					
	Edwards		Ohmer	Rico						O-B Co.				Lord			
			Ohmer														
Consol							H-B			Earll				Lord			Chil'wth
			Sterling	Rico	Consol								Rico	O-B Co.			
					Consol	O-B Co.							Rico				
Consol			Ohmer	Rico							Peerless						
	Edwards					O-B Co.				Earll			Rico	Lord			
								Esterline									
				Rico	Consol		H-B			Earll			Rico				
		Johnson		Rico	Consol												
						O-B Co.							Rico				
Consol				Rico				Esterline									
		Johnson	Ohmer							Earll							
			Ohmer														
			Ohmer							Earll							
														Rollway			
				Rico	Consol		H-B						Rico				
				Rico		O-B Co.							Rico				
	Edwards		Ohmer	Rico	O-B Co.	O-B Co.	H-B				Peerless	S-W-B					
	Edwards		Ohmer														
				Rico							Part Peerless		Rico				Chil'wth
				Rico									Rico				Chil'wth
				Rico	Consol		H-B		O-B Co	O-B Co.							
			Ohmer							Earll							Chil'wth
					Consol	O-B Co.											
																	Chil'wth
Consol										Earll							
Consol																	
				Rico			H-B	Esterline									
			Ohmer				Prov.										
Consol	Edwards	Johnson			Consol	O-B Co.	H-B	Esterline									
Consol					Consol								Rico				
			Ohmer														
		Ohmer	Ohmer		Consol					Earll			Rico				
			Ohmer		Consol	O-B Co.											
Consol													Rico				
			Ohmer			O-B Co.		Esterline	O-B Co.	Earll							
	Edwards	Johnson						Esterline									
				Rico			H-B	Esterline									
					Consol		H-B			Earll			Rico				
	Edwards	Johnson			Consol	O-B Co.	H-B	Esterline									
		Johnson			Consol		Prov.	Esterline		Earll			Rico				
	Edwards	Johnson	O-B Co.	Rico	Consol	O-B Co.	Prov.	Esterline									
	Edwards	Johnson	O-B Co.	Rico	Consol	O-B Co.	Prov.	Esterline					Rico				Chil'wth
			Ohmer	Rico				Esterline					Rico				Chil'wth
			Ohmer					Esterline					Rico				
								Esterline									
	Edwards			Rico	Consol		H-B			Earll							
											Peerless		Rico				

Table of Advertisers in this Section whose equip

Purchaser	No.	General Type	Motor or Trailer	Length of Car Body	City or Int.	All-steel, Semi-steel or Wood	Body	Pre-payment	Door Op. Mech.	Compressor Air Cleaner	Brakes, Hand	Heaters
Evansville Sub. & Newb. Ry	10	Gondola		36- 0		Wood					N. B. Co.	
Fargo & Moorhead St. Ry	1	Ps. Clsd	Motor	33- 0	City	Wood	American					
Fitchburg & Leominster St. Ry	1	Ps. Conv	Motor	30- 8	Int	Semi-steel	Wason					
Florence & Huntsville Int. Ry	3	Pass	Trail		Int							
	2	Pass	Motor		Int						N.B. Co.	
Fort Dodge, Des Moines & Southern R. R.	1	Ps. Clsd	Motor	32- 0	City	Semi-steel					N.B. Co.	
Fort William Elec. Ry	1	Work & Snow Plow		30- 0	City	Wood						
Freeport Ry. & Lt. Co	1	Ps. Clsd	Motor	30- 0	City	Semi-steel						
Gadsden, Bellevue & Lookout Mountain Ry	2	Ps. Open	Motor		Int							
	2	Pass	Trail		Int							
Gary, Hobart & Ea. Trac. Co	2	Ps. Open	Motor		City	Wood						
	2	Ps. Conv	Motor	42- 6	Int	Wood						
	1	Ps. Clsd	Motor		City	Wood					N.B. Co.	Consol.
Geneva, Seneca Falls & Auburn R. R.	2	Ps. Clsd	Motor	34- 0	Int	Semi-steel						
Goldsboro St. Ry	2	Ps. Clsd	Motor		City							
Grafton Lt. & Pwr. Co	3	Pass		21- 0	City	Wood						Consol.
Greeley & Denver R. R.	2	Ps. Clsd	Motor	28- 0	City	Semi-steel	American					Consol.
Guelph Radial Ry	2	Ps. Clsd	Motor	32- 0	City	Semi-steel						
Hagerstown & Frederick Ry	3	Ps. Conv	Motor	30- 6½	City	Semi-steel	Brill					
Harrisburg Rys	6	Ps. Conv	Motor	25- 0	City	Semi-steel	Brill	PCSCo.	PCSCo.	Lord	N.B. Co.	Consol.
	4	Ps. Conv	Motor	31- 8	Int	Semi-steel	Brill					Consol.
Havana Central R. R.	3	Pass	St. Bat									
Havana Central R. R.	1	Work										
Hershey Transit Co	3	Flat										
	1	Snow Plow										
Hocking-Sunday Creek Trac. Co	3	Pass	Motor	32- 6	Int	All-steel	Cin- Car					
Homestead & Mifflin St. Ry	1	Ps. Clsd	Motor	21- 0	City	Wood					N.B. Co.	
Houston Elec. Co	10	Ps. Conv	Motor	26- 6	City	Steel	American			Lord	N.B. Co.	Consol.
Hutchinson Inter Ry	1	Ps. Conv	Motor	30- 0	City	All-steel			PCSCo.			
Idaho Ry., Lt. & Pwr. Co	1	Work		28- 0								
Illinois Central R. R.	4	Gas-electric	Motor	71- 0	Int	All-steel						
Illinois Traction System	30	Hopper Bot										
Indianapolis & Louisville Trac. Co	1	Pass	Trail	42- 0	Int	Wood						
Interborough Rapid Transit Co	10	Side Dump		33- 0		Steel						
Ithaca Traction Corp	5	Ps. Open	Motor	28- 8	City	Semi-steel	Wason	PCSCo.			Lord	Consol.
	5	Ps. Clsd	Motor	20- 8	City	Semi-steel	Wason				Lord	Consol.
Jackson Ry. & Lt. Co	4	Ps. Clsd	Motor	32- 0	City	Semi-steel	American					
	1	Work		26- 0	City	Wood						
Jacksonville Trac. Co	15	Ps. Clsd	Motor	26- 6	City	Semi-steel	American				N.B. Co	Consol.
Jamestown, Westfield & Northwestern R. R.	6	Ps. Clsd	Motor	53- 6	Int	All-steel	Cin. Car					
	2	Bagg	Motor	43- 0	Int	Semi-steel						
	1	Sweeper		28- 3	City	Semi-steel						
	1	Work		45- 0	City	All-steel	Cin. Car					
	1	El. Loco		45-Ton								
Janesville Trac. Co	4	Pass	Motor	30- 0	City	All-steel						Consol.
Jefferson Tract. Co	1	Ps. Clsd	Motor	33-10	Int	Semi-steel	Kuhlman					Consol.
Jersey Central Traction Co	5	Ps. Clsd	Motor	42- 2	Int	Semi-steel	Brill					
	1	Flat	Motor	34- 0		Steel					N.B. Co.	
Kansas City, Clay County & St. Joseph Ry	1	Line Car		40- 0	Int	Wood						Consol.
Kansas City, Kaw Valley & Western Ry	4	Ps. Clsd	Motor	50- 0	Int	All-steel	Cin. Car					
	4	Ps. & Bag	Trail	48- 0	Int	Wood	Cin. Car					
	1	Express	Motor	48- 0	Int	Wood						
	6	Gondola										
	1	Flat				W'd & St'l						
	1	Work		30- 0		All-steel						
Kansas City, Lawrence & Topeka Elec. R. R.	1	Express	Motor	40- 0	Int	Wood						
Kansas-Oklahoma Trac. Co	1	Ps. & Bag	Motor	50- 5	Int	Semi-steel	American					
Keokuk Elec. Co	1	Ps. Clsd	Motor	21- 0	City	Semi-steel	American				N.B. Co.	Consol.
Kingston Consol. R. R.	1	Snow Plow	Motor	26- 0	City	Wood	Wason					
Lackawanna & Wyoming Valley R. R.	15	Steel Hop		31- 2½		All-steel						
Lancaster Trac. & Power Co	2	Ps. Clsd	Motor	18- 0	City	All-steel	Cin. Car					
Lawton Ry. & Lt. Co	2	Ps. Open	Trail	34- 0	City	Wood	Brill					Consol.
Lebanon & Campbelltown Ry	2	Ps. Conv	Motor	30- 8	Int	Semi-steel	Brill				N.B. Co.	
Lehigh Valley Tract. Co	2	Freight		45- 0	Both	Wood						
	1	Work		40- 0	Both	Wood						
	1	Work		30- 0	Both	Wood						
	1	Line		33- 0	Both	Wood						Consol.
	1	Private		50- 2	Both	Wood						
Lewisburg & Ronceverte Ry	1	El. Loco		25-Ton							N.B. Co.	
Lincoln Trac. Co	4	Ps. Clsd	Motor	41- 0	City	Semi-steel	American					
	2	Pass	Trail	39- 0	City	Semi-steel	American					
London & Port Stanley Ry	3	El. Loco		60-Ton							N.B. Co.	
London St. Ry	4	Ps. Clsd	Motor	21- 0	City	Semi-steel				Lord		
Long Island R. R.	2	Ps. Clsd	Motor	22- 7	Int	Semi-steel	Brill					
Los Angeles & San Diego B'h Ry	5	Ps. Calif. Type	Motor	50- 0	City	Semi-steel						
	4	Ps. Calif. Type	Trailer	50- 0	City	Semi-steel						
Los Angeles Ry	1	Ps. Clsd	Motor	46- 0	City	Compos						
Macon Ry. & Lt. Co	9	Pass		20- 0	City	Semi-steel						
Mahoning & Shenango Ry. & Lt. Co	20	Pass	Motor	45- 0	City	All-steel		PCSCo.	PCSCo.		N.B. Co.	Consol.
Manhattan Bridge Three-Cent Line	6	Ps. Conv	Motor	33- 3	City	Semi-steel	Southern				Lord	Consol.
Manhattan & Queens Trac. Corp	1	Sprinkler		33- 0	City	Wood	Brill					
Mansfield Ry., Lt. & Pwr. Co	2	Pass		19- 6½	City	Semi-steel	Brill					
Memphis St. Ry	25	Ps. Clsd	Motor	31- 6	City	St'l Un. Fr					N.B. Co.	Consol.
	10	Pass	Trail	30- 3	City	St'l Un. Fr.					N.B. Co.	Consol.
	1	Sprinkler			City	Steel						
Mesaba Railway	1	Ps. Clsd	Motor	49- 0	Int	Steel						
Miami Trac. Co	4	St. Bat	Motor		City	Wood						Consol.
Michigan Central R. R. (Detroit River Tunnel Co.)	4	El. Loco	Motor	120-Ton								
	1	Wreck Crane										
Michigan Railway	6	Ps. Clsd	Motor	67- 0	Int	All-steel						
	6	Ps. Clsd	Motor	61- 0	Int	All-steel						
	4	Express	Motor	61- 0	Int	All-steel						
Michigan United Trac. Co	6	Ps. Clsd	Motor	61- 0	Int	All-steel						
	4	Pass	Trail	56- 8	Int	All-steel						
Milford & Uxbridge St. Ry	2	Snow Plow					Wason					
Minneapolis, St. Paul & Sault Ste. Marie Ry	1	Gasoline, Mech. Drive		70- 0	Int	All-steel						
Minneapolis, St. Paul, Rochester & Dubuque El. Tr. Co.	5	Gas-elec	Motor		Int	Steel						
Minneapolis & Northwestern Elec. Ry	1	Gas-elec	Motor		Int							
Missouri & Kansas Inter. Ry	2	Pass	Trail	35-10	Int	Wood						
Missouri & N. Arkansas R. R.	1	Gas-elec	Motor	70- 0	Int	Steel						
Mobile & Baldwin Co. R. R.	1	Pass		22- 0	City							
	2	Gasoline	Motor		Int							
	1	Service										
	1	Flat										
	1	Flat		34- 0		Wood						
Montreal & So. Counties Ry	10	Ps. Clsd	Motor	36- 0	Int	All-steel	Cin. Car				Lord	
Morris County Trac. Co	1	Sweeper		28- 3	City	Semi-steel						
	1	Gasoline, Mech. Drive		70- 0	Int	All-steel						
Motley County R. R.	1	Express	Motor	35- 0	Int	Semi-steel						
Mt. Mansfield Elec. Ry	125	Ps. Calif. Type	Motor	32- 4	City						N.B. Co.	Conso
Mun. Rys. of San Francisco	1	Flat		40- 0	Int	Semi-steel						
New Bedford & Onset St. Ry	4	Ps. Clsd	Motor	52- 0	Int	All-steel	Cin. Car				N.B. Co.	
New Jersey & Penna. Tr. Co	2	Bagg		45- 0	Int	Steel	Brill					

ment was supplied for cars ordered during 1914

Curtain Fixtures	Thermo-stats	Window Fixtures	Fare Boxes	Regis-ters	Sanitary Straps	Electric Car Signals	Coup-lers	Fenders and Whlgds	Head-lights	Air Sanders	Trolley Catch's	Venti-lators	Slack Adj't'rs	Anti-Climb-ers	Trolley Bases	Ball or Roller Bearings	Trap Doors	Gear Cases
Cur.S. Co.								Prov.										
Cur.S. Co.											Earll.							
Cur.S. Co.			Johnson.															
Cur.S. Co.			Johnson.				O-B Co.	H-B.			Earll.							
				Ohmer.		Consol.		Prov.										
Cur.S. Co.																		
Cur.S. Co.					Rico.	Consol.		H-B.			Earll.							
Cur.S. Co.				Ohmer.														Chil'wth.
					Rico.	Consol.							S-W-B.	Rico.				Chil'wth.
						Consol.							S-W-B.					
																Rollway.		
																Rollway.		
		Edwards.	Johnson.			Consol.	O-B Co.	H-B.										
Cur.S. Co.		Edwards.							Esterline.									
									Esterline.									
				Ohmer.														
Cur.S. Co.									Esterline.									
Cur.S. Co.									Esterline.									
Cur.S. Co.								H-B.	Esterline.		Earll.							
Cur.S. Co.		Edwards.	Johnson.			Consol.		H-B.	Esterline.									
Cur.S. Co.	Consol.				Rico.	O-B Co.	O-B Co.		Esterline.					Rico.				
						O-B Co.	O-B Co.							Rico.				
						O-B Co.	O-B Co.		Esterline.									
						O-B Co.	O-B Co.		Esterline.									
Cur.S. Co.						O-B Co.	O-B Co.											
Cur.S. Co.					Rico.									Rico.				
														Rico.				
	Consol.						O-B Co.											
						Consol.	O-B Co.											
Cur.S. Co.																		
Cur.S. Co.		Edwards.		Sterling.		Consol.		H-B.										
Cur.S. Co																		
							O-B Co.				Earll.							
							O-B Co.											
							O-B Co.											
		Edwards.					O-B Co.											
							O-B Co.											
Cur.S. Co.		Edwards.	Johnson.	Ohmer.					Esterline.					Rico.			Edwards.	
Cur.S. Co.		Edwards.		Ohmer.					Esterline.									
						Consol.												
Cur.S. Co.								H-B.										
Cur.S. Co.																		
Cur.S. Co.																		
Cur.S. Co.		Edwards.		Ohmer.	Rico.	Consol.	O-B Co.		Esterline.		Earll.			Rico.	O-B Co.			
Cur.S. Co.					Rico.			H-B.			Earll.			Rico.	O-B Co.			
								Prov.	Esterline.		Earll.			Rico.				
Cur.S. Co.		Edwards.																Chil'wth
Cur.S. Co.		Edwards.							Esterline.					Rico.				
Cur.S. Co.		Edwards.		Ohmer.	Rico.	Consol.	O-B Co.							Rico.			Edwards.	
Cur.S. Co.							O-B Co.											
Cur.S. Co.							O-B Co.							Rico.				
		Edwards.					O-B Co.											
Cur.S. Co.		Edwards.			Rico.	Consol.	O-B Co.							Rico.			Edwards.	
						Consol.											Edwards.	
		Edwards.							Esterline.									
Cur.S. Co.																		
							O-B Co.											
					Rico.	O-B Co.		Prov.			Earll.			Rico.	O-B Co.			
															O-B Co.			
Cur.S. Co.			Johnson.			Consol.			Esterline.					Rico.				Chil'wth
														Rico.				
														Rico.				

Table of Advertisers in this Section whose equi

Purchaser	No.	General Type	Motor or Trailer	Length of Car Body	City or Int.	All-steel, Semi-steel or Wood	Body	Pre-payment	Door Op. Mech.	Compressor Air Cleaners	Brakes, Hand	Hea
New Orleans Ry. & Lt. Co	50	Ps. Clsd	Motor	47- 8	City	Semi-steel	Southern	PCSCo...	PCSCo...			
N. Y. Central & H. R. R. R.	1	Wreck Crane	Motor									
New York Municipal Ry	200	Ps. Clsd	Motor	66- 2¼	S.&E.	All-steel			Consol		N.B. Co.	
New York, New Haven & Hartford R. R.	1	El. Loco	Motor	130-Ton								Cons
Newport News & Hampton Ry. Gas & Elec. Co	1	Express	Motor	45- 0		Wood						
Niagara, St. Catherines & Toronto Ry	6	Ps. Clsd	Motor	55- 6	Int.	Semi-steel				Lord	N.B. Co.	Cons
	6	Ps. Clsd	Motor	45- 0	City	Semi-steel					N.B. Co.	Cons
	2	El. Loco	Motor	34-Ton		Steel					N.B. Co	
Nipissing Central Ry	2	Ps. Clsd	Motor	51- 0	Int.	Semi-steel						
Norfolk & Western Ry	12	El. Loco	Motor	270-Ton	Int.							
Northern Elec. Ry	1	Ft. Loco	Motor			All-steel						
	1	Ft. Loco	Motor			W'd&St'l						
Northern Ohio Tr. & Lt. Co	16	Ps. Clsd	Motor	35- 5½	City	Semi-steel	Kuhlman				N.B. Co.	
	5	Ps. Smok		42- 1¾	Int.	Wood	Kuhlman					
North Carolina Pub. Ser. Co	2	Ps. Conv	Motor	26- 0	City	Steel	Southern					Cons
Northern Texas Trac. Co	20	Ps. Clsd	Motor	33- 9	City	Semi-steel	American				N.B. Co.	Cons
Ogden, Logan & Idaho Ry		Ps. Clsd	Motor	60- 0	Int.	All-steel	American			Lord		
Ogdensburg St. Ry	1	Ps. Clsd	Motor	20- 8	City	Semi-steel	Wason				N.B. Co.	Cons
Ohio Elec. Ry	5	Ps. Clsd	Motor	50- 3	Int.	Steel		PCSCo...	PCSCo...			
		Express	Motor	50- 0	Int.	Wood						
	14	Box Ft		38- 6	Int.	Wood						
Oklahoma Ry	1	Box Ft		36- 0	Int.	Wood						
Orleans-Kenner Ry	4	Ps. & Smoking	Motor	54- 8	Int.	Semi-steel	American					
Otsego & Herkimer R. R	1	Express	Motor	45- 0	Int.	Semi-steel					Lord	
	2	Gondola										
	8	Dump										
Pacific Elec. Ry	24	Ps. Clsd	Motor	58- 1	Int.	All-steel						Cons
Pacific Gas & Elec. Co	6	Ps. Calif. Type	Motor	38- 0	City	Semi-steel	American					
Pacific Great Eastern Ry	2	Gasoline		65- 0	Int.	All-steel						
Panama Tramways	1	Pass	St. Bat									
Parkersburg, Marietta & Int. Ry	2	Ps. Clsd	Motor	50- 0	Int.	All-steel	Cin. Car	PCSCo...	PCSCo...		Lord	
		Ps. Clsd	Motor	38- 0	City	Semi-steel						
	4	Ps. Clsd	Motor	22- 0	City	Semi-steel						
Peninsular Ry	1							PCSCo...	PCSCo...			Cons
Pennsylvania & Ohio Ry	1	Pass. & Smok	Motor	31- 8	Int.	Wood	Kuhlman					
Penn. R. R. (also 84 pass. coaches equipped with motors)	9	Ps. Clsd	Motor	54- 6	Sub.	All-steel						Cons
Peterborough Radial Ry	2	Ps. Clsd	Motor	30- 0	City	Wood					N.B. Co.	Cons
Phila. & Garretsford St. Ry	5	Ps. Clsd	Motor	44- 6	Int.	Semi-steel				Lord		Cons
Piedmont & Northern Ry	8	Ps. Clsd	Trail	62- 0	Int.	All-steel	Southern				N.B. Co	
	2	Parlor		62- 0	Int.	All-steel	Southern					
Piedmont Ry. & Elec. Co	1	Ft. Loco		25- 0		Wood						
Pittsburgh, Harmony, Butler & New Castle Ry	5	Ps. Clsd	Motor	54- 0	Int.	Wood					N.B. Co.	
	1	Express	Motor	35- 0	Int.	Wood						
Pittsburgh Rys	50	Ps. Clsd	Motor	45- 2	City	Steel					N.B. Co.	Con
	50	Ps. Clsd	Motor	45- 2	City	Steel					N.B. Co.	Con
Port Arthur Municipal Ry	1	Ps. Conv	Motor	26- 0	City	Wood						Con
	3	Ps. Conv	Motor	26- 0	City	Semi-steel						Con
Port Arthur Traction Co	4	Ps. Clsd	Motor	32- 0	City	Semi-steel					N.B. Co.	Con
Portland, Eugene & Ea. Ry	4	Ps. Conv	Motor	21- 0	City	Semi-steel	American					Con
	8	Bagg. & Mail	Motor	47- 0	Int.	Steel	Brill					Con
Portland Ry., Lt. & Pwr. Co	8	Ps. Clsd	Motor	50- 0	Int.	Semi-steel					Lord	Con
	3	Ps. Clsd	Trail	50- 0	Int.	Semi-steel						Con
	1	El. Loco	Motor	50-Ton		Steel						
Pottstown & Phoenixville Ry	8	Ps. Clsd	Motor		Int.							Con
Princeton Power Co	4	Ps. Clsd	Motor		Int.							
Public Service Ry	15	Ps. Clsd	Motor	34- 0	Int.	Wood					Lord	Con
	10	Ps. Clsd	Motor	32- 0	City							Con
	1	Sweeper		28- 0		Wood						
	6	Side Dump	Trail	33- 0		Steel						
	1	Line Car		18- 0		Wood						
Puget Sound Trac., Lt. & Power Co. (Bellingham Div.)	1	Ps. Conv	Motor	50- 0	City	Semi-steel					N.B. Co.	Con
Puget Sound Trac., Lt. & Power Co. (Seattle Div.)	12	Ps. Clsd	Motor	38- 0	City	Semi-steel					Lord	Con
Regina Municipal Ry	1	Flat		21- 0	City	Wood						
Reno Traction Co	1	Ps. Clsd	Motor	34- 0	City	Semi-steel						
Rhode Island Co	50	Ps. Conv	Motor	29- 0	City	Semi-steel					N.B. Co.	Con
Richmond Light & R. R. Co	32	Ps. Clsd	Motor	28- 0	City	All-steel		PCSCo...	PCSCo...		Lord	Con
Rockford & Interurban Ry	4	Ps. Clsd	Motor		City							
Rockland, Thomaston & Camden St. Ry	1	Bagg		30- 0	Int.	Semi-steel						
Saginaw Bay City Ry	1	Sprinkler			City						N.B. Co	
St. John Ry	12	Ps. Clsd	Motor	31- 0	City	Wood					N.B. Co.	Con
St. Joseph Ry. Light, Heat & Power Co	2	Pass			City							
	1	Work										
St. Joseph Valley Ry	1	Gasoline		65- 0	Int.	All-steel						
St. Louis Southwestern Ry	8	Gas-Elec	Motor		Int.	All-steel						
St. Louis Water Works Ry	2	Pass	Motor	39- 0	Sub.	Semi-steel						Co
St. Paul Southern Ry	2	Ps. Clsd	Motor	51- 0	Int.	Semi-steel					N.B. Co	
	2	Bag. & Pass	Motor	51- 0	Int.	Semi-steel						
St. Petersburg & Gulf Ry	2	Ps. Open	Motor	36- 0	Both	Wood					N.B. Co	
	2	Ps. Conv	Motor	40- 0	Both	Semi-steel	Brill					
		Ps. Conv	Motor	46- 0	Both	Semi-steel						
	1	Express	Motor	40- 0	Both	Semi-steel	Brill					
		Flat		20- 0	Both	Wood					N.B. Co	
Salt Lake & Utah R. R.	2	Ps. Clsd	Motor	31- 8	City	All-steel						Co
	5	Ps. Clsd	Motor	59- 8	Int.	All-steel					N.B. Co.	Co
	2	Ps. Clsd	Trail	58- 7½	Int.	All-steel						Co
	2	Ft	Motor	50- 0	Int.	All-steel						
	1	El. Loco	Motor	50- 0	Int.							
San Antonio Trac. Co	3	Work									Lord	
	11	Flat					American				Lord	
San Diego Elec. Ry	41	Ps. Calif. Type	Motor	50- 0	City	Semi-steel					N.B. Co.	
Santa Barbara & Sub. Ry	2	Ps. Clsd	Motor	39- 4	City	Semi-steel	Brill					
	1	Express	Motor	35- 0		Wood						
	4	Flat		34- 0		Wood						
Scranton Ry	10	Ps. Clsd	Motor	30- 6	City	Semi-steel	Brill				N.B. Co.	Cool
Seattle Municipal Ry	8	Box Ft		42- 0	City	Wood						
Shamokin & Mt. Carmel Transit Co	1	Sweeper	Motor	24- 0		Wood	Brill					
Sheboygan Ry. & Elec. Co	2	Ps. Clsd	Motor	49- 0	Int.	Semi-steel		PCSCo...	PCSCo...		N.B. Co	Cool
Shreveport Traction Co	1	Sprinkler			City						N.B. Co.	
Sioux City Service Co	8	Ps. Clsd	Motor	38- 0	City							
Slate Belt Elec. St. Ry	2	Ps. Conv	Motor	30- 1	Int.	Semi-steel	Brill	PCSCo...	PCSCo...	Lord		
Southern Cambria Ry	1	Express	Motor	51- 0	Int.	Wood					N.B. Co.	
Southern Public Utilities Co	6	Ps. Clsd	Motor	39- 0	City	Semi-steel	Southern					Cool
Southern Tr. Co. of Illinois	6	Ps. Clsd	Motor	38- 0	Int.	Semi-steel						
Southern Trac. Co	11	Ps. Clsd	Motor	28- 0	City	All-steel					N.B. Co.	Cool
Southwestern Trac. Co	1	Pass		46- 8	Int.							Cool
Spokane, Portland & Seattle	1	Gas-elec	Motor		Int.	Steel						
Springfield Consol. Ry	12	Ps. Open	Motor	38-10	City	Wood						
Springfield Ry	10	Ps. Clsd	Motor	28- 0	City	Semi-steel	Brill	PCSCo...	PCSCo...	Lord		
Springfield Street Ry	10	Ps. Conv	Motor	30- 0	City	Semi-steel	Wason	PCSCo...	PCSCo...		N.B. Co.	Cool
Stark Electric R. R	2	Pass		55- 0	Int.	Steel						
	1	Snow Plow			Int.	Wood						
Steubenville & East Liverpool Ry. & Light Co	4	Ps. Clsd		33- 2	City	Semi-steel	Kuhlman	PCSCo...	PCSCo...		N.B. Co	

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Thermo-stats	Window Fixtures	Fare Boxes	Regis-ters	Straps Sanitary	Electric Car Signals	Coup-lers	Fenders and Whlgds	Head-lights	Air Sanders	Trolley Catch's	Venti-lators	Slack Adj't'rs	Anti-Climb-ers	Trolley Bases	Ball or Roller Bearings	Trap Doors	Gear Cases
	Edwards				Consol					Earll			Rico				Chil'wt h
	Edwards				Consol							S-W-B	Rico				Chil'wth
								Esterline									
	Edwards				Consol	O-B Co	Prov						Rico	O-B Co			
	Edwards				Consol	O-B Co	Prov						Rico	O-B Co			
					O-B Co									O-B Co			
	Edwards																
	Edwards		Ohmer		O-B Co	O-B Co			O-B Co				Rico				
	Edwards		Ohmer		O-B Co	O-B Co			O-B Co								
	Edwards	Johnson				O-B Co		Esterline	O-B Co	Earll							
				Rico	O-B Co	O-B Co				Earll			Rico	O-B Co			
			Ohmer		Consol												
			Ohmer		O-B Co	O-B Co			O-B Co	Peerless		Rico					
						O-B Co						Rico					
						O-B Co											
			Ohmer														
										Earll							
	Edwards		Ohmer										Rico			Edwards	
		Johnson						Esterline									
															Rollway		
			Sterling	Rico	Consol	O-B Co			O-B Co				Rico				
			Sterling		Consol	O-B Co			O-B Co								
			Sterling		Consol	O-B Co			O-B Co								
			Ohmer														
			Ohmer				Prov										
	Edwards																Chil'wth
	Edwards						H-B										
						O-B Co				Earll			Rico			Edwards	
				Rico		O-B Co							Rico				
						O-B Co											
	Edwards		Ohmer	Rico				Esterline					Rico				
	Edwards		Sterling								Peerless						
	Edwards		Sterling								Peerless						
						O-B Co											
						O-B Co											
						O-B Co											
	Edwards				Consol	O-B Co							Rico				
	Edwards		Ohmer														
	Edwards		Ohmer														
				Rico									Rico				
Consol	Edwards	Johnson	Sterling		Consol	O-B Co	H-B						Rico				Chil'wth
Consol	Edwards	Johnson	Sterling		Consol	O-B Co	H-B						Rico				Chil'wth
						O-B Co							Rico				
						O-B Co							Rico				
						O-B Co							Rico				
	Edwards												Rico				
	Edwards	Johnson			Consol			Esterline		O-B Co			Rico				
		Johnson	Ohmer			O-B Co		Esterline									
		Johnson			Consol		Prov	Esterline	Lord			S-W-B					
Consol		Johnson		Rico	Consol		H-B	Esterline		Earll			Rico				
		Johnson			Consol	O-B Co											
													Rico				
					Consol									Lord			
								Esterline									
					Consol								Rico				
								Esterline									
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	Edwards									Earll							
	Edwards															Edwards	
	Edwards															Edwards	
								Esterline	O-B Co								
	Edwards		Sterling	Rico	Consol		H-B	Esterline	O-B Co				Rico				
		Johnson	Sterling		Consol		H-B			Earll			Rico				
										Earll			Rico				
													Rico				
onsol	Edwards		Sterling	Rico	Consol		H-B				Peerless	S-W-B	Rico				
								Esterline		Earll							
	Edwards		Ohmer								Peerless						
								Esterline									
								Esterline					Rico				
				Rico			Prov						Rico				
			Ohmer														
				Rico									Rico				Chil'wth
			Ohmer					Esterline					Rico				
			Ohmer				H-B				Peerless		Rico				
onsol					Consol								Rico				
						O-B Co											
			Ohmer				H-B										

Table of Advertisers in this Section whose eq

Purchaser	No.	General Type	Motor or Trailer	Length of Car Body	City or Int.	All-steel, Semi-steel or Wood	Body	Pre-payment	Door Op. Mech.	Compressor Air Cleaners	Brakes Hand
Stroudsburg Pass. Ry	1	Ps. Clsd	Motor	28- 0	City		Brill				N.B.Co
Sunbury & Susquehanna Ry	4	Ps. Clsd	Motor	41- 0	Int		Cin. Car				
Sunset Central R. R	3	Gasoline, Mech. Drive		10- 0	Int	All-steel					
Tacoma Ry. & Power Co	5	Ps. Clsd	Motor	34- 5	City	Semi-steel					N.B.Co
Tennessee, Kentucky & Nor. R. R	1	Gasoline, Mech. Drive		70- 0	Int	All-steel					
Terre Haute, Indianapolis & Eastern Trac. Co	1	Express	Trail	45- 0	Int	Semi-steel					
Texas Traction Co	1	Ps. Clsd	Motor	28- 0	City	All-steel					
Third Ave. Ry	50	Ps. Conv	Motor	24- 0	City	Semi-steel	Brill	PCSCo.	PCSCo.		
	2	Snow Plow		40- 0	City	Wood					
	12	Sweeper		26- 0	City	Wood					
	2	Scrapers		29- 0	City	Wood					
	1	Wing Car		29- 0	City	Wood					
Tidewater Power Co	3	Ps. Conv	Motor	20- 8	City	Semi-steel	Brill				Lord
Toledo & Western R. R	2	Cars									
Toledo, Fostoria & Findlay Ry	2	Ps. Clsd	Motor	51- 0	Int	Steel					N.B.Co
Topeka Ry	6	Pass	Trail	45- 0	Park	Semi-steel					
Toronto Suburban Ry	2	Ps. Clsd	Motor	46- 0	Int	Semi-steel					
	1	Sweeper		28- 3	City	Semi-steel					
Transit Development Co	26	Air Dump	Trail	26- 0		Wood					
	[redacted]	Rail Trucks		53- 0		All-steel					
Trenton & Mercer County Trac. Corp	10	Ps. Clsd	Motor	32- 8	City	Semi-steel	Brill	PCSCo.	PCSCo.	Lord	N.B.Co
Trenton, Bristol & Philadelphia St. Ry	5	Ps. Clsd	Motor	30- 6	Int	Semi-steel	Brill	PCSCo.	PCSCo.		N.B.Co
Twin City Rapid Transit Co	60	Ps. Conv	Motor	48- 0	City	Semi-steel					
Union Electric Co	6	Ps. Clsd	Motor	27- 4	City	Semi-steel	American	PCSCo.			N.B.Co
Union St. Ry	6	Ps. Clsd	Motor	33- 0	Int	Wood					Lord
	1	Snow Plow		31- 6½	Both	Wood					
	1	Air Sander		35- 0	City	Semi-steel					
Union Pacific R. R	5	Gasoline, Mech. Drive		70- 0	Int	All-steel					
United Rys. & Elec. Co	85	Ps. Conv	Motor	30- 8	City	Semi-steel	Brill				
United Rys. of St. Louis	68	Pass			City						
Utah Light & Trac. Co	18	Ps. Clsd	Motor	36- 0	City	Semi-steel	American	PCSCo.	PCSCo.		
	6	Ps. Clsd	Motor	36- 0	City	Semi-steel	American				
Vicksburg Lt. & Trac. Co	2	Ps. Clsd	Motor	21- 0	City	Semi-steel					
Walla Walla Valley Ry	1	Express	Motor	41- 0	Int	Semi-steel					N.B.Co
Washington, Baltimore & Annapolis Electric R. R	10	Ps. Clsd	Motor	51- 0	Int	All-steel	Cin. Car				
	3	Ps. & Bag		51- 2	Int	All-steel	Cin. Car				
Washington-Virginia Ry	5	Ps. Clsd	Motor	50- 8	Int	All-steel	Southern		Consol		Lord
Washington Ry. & Elec. Co	3	Work		21- 9		Wood					
	[redacted]	El. Loco	Motor	30- 0		Semi-steel					
Waterbury & Milldale Tramway	2	Ps. Conv	Motor	30- 8	Int	Semi-steel	Wason				
Waterloo, Cedar Falls & Nor. Ry	5	El. Loco	Motor	60-Ton	Int	All-steel					N.B.Co
	4	Com. Ps		58- 0	Int	All-steel					
	3	Observ		61- 0	Int	All-steel					
Wellsburg, Bethany & Washington R. R	1	Ps. Motor	Motor	30- 6	Int	Wood					
West Penn. Trac. Co	[redacted]	Ps. Clsd	Motor	56- 0	Int	Semi-steel					
	4	Ps. Clsd	Motor	46- 0	Sub	Semi-steel					
Western New York & Pa. Trac. Co	[redacted]	Flat Car	Motor	36- 0	Both	Wood					
Western Ohio R. R	1	El. Loco	Motor	35-Ton							
Westmoreland County Ry	3	Ps. Clsd	Motor	40- 0	Int	Steel	Cin. Car				
Wichita Falls Trac. Co	3	Ps. Clsd	Motor	27- 0	City	Semi-steel	American				N.B.Co
Wilkesbarre Ry	[redacted]	Ps. Clsd	Motor	47- 0	City	Semi-steel	Brill				
Willamette-Pacific Ry	[redacted]	Gasoline, Mech. Drive		55- 0	City	All-steel					
Windsor, Essex & Lake Shore Ry	2	Ps. Clsd	Motor		Int						
Winnipeg Electric Ry	20	Pass		33- 0	City				Consol		N.B.Co
Wisconsin-Minnesota Light & Pwr. Co	1	Ps. Clsd	Motor	34- 0	Int	Semi-steel					
Wisconsin Public Serv. Co	[redacted]	Ps. Clsd	Motor	28- 0	City	All-steel					
Worcester Consol. St. Ry	10	Ps. Conv	Motor	30- 0	City	Semi-steel		PCSCo.	PCSCo.		N.B.Co
Yakima Valley Transp. Co	4		Trail	46- 0	Int	Wood					N.B.Co
York Rys	[redacted]	Pass	Trail	46- 0	Int	Stl. frame					N.B.Co
Yuma Valley Ry	1	Gasoline, Mech. Drive		55- 0	Int	All-steel					

List of Articles and Specifications wh

describing some of the

NAME OF ROAD	TITLE OF ARTICLE	PAGE NO.	ISSUE
Albany, Southern R.R.	New All-Steel Cars for	224	Aug. 1, 19
Bartlesville Interurban Ry	A single Truck fully enclosed car	85	July 11, 19
Boston Elevated Ry.	Center Entrance trailers	97	Jan. 9, 19
Cambria & Indiana Ry.	Storage Battery Car for	1356	Dec. 19, 19
Central N. Y. Southern R. R.	Gasoline Motor Cars for	1409	June 20, 19
Charleston Interurban R. R.	Specifications, 12 Closed Cars	1126	Nov. 14, 19
Charlottesville & Albemarle Ry.	Rolling Stock	906	Oct. 17, 19
Chicago Elevated Rys.	New Steel Cars for	84	Jan. 10, 19
" " "	Pressed Steel Cars for	1234	Dec. 5, 19
" " "	Specifications, 128 Cars	503	Feb. 28, 19
Chicago, Mil. & St. Paul R. R.	Locomotives	1153	Nov. 21, 19
Chicago & West Towns Ry.	Rolling Stock	468	Sept. 12, 19
City Railway, Dayton, O.	Specifications, 20 Pass. Cars	290	Jan. 31, 19
Cleveland Ry.	Center Entrance Motor Cars	455	Feb. 28, 19
" "	Specifications, 200 Closed Cars	944	Oct. 17, 19
Dallas Cons. Elec. St. Ry.	Specifications, 15 Closed Cars	1084	Nov. 7, 19
Easton Transit Co.	Specifications, 9 Single Truck Cars	803	Apr. 4, 19
Editorial	The All-Steel Car	3	Jan. 2, 19
"	Car Design in 1914	11	Jan. 2, 19
"	Corrosion of All-Steel Cars	415	Sept. 5, 19
"	Hybrid Steel-Underframe Car	374	Aug. 29, 19
"	Life of All-Steel Cars	507	Sept. 19, 19
"	Somnolence in Car Design	294	Feb. 7, 19
El Paso Elec. Ry.	Specifications, 6 Closed Cars	1018	May 2, 19
Empire United Railways	Specifications, 12 City Cars	548	Sept. 19, 19
Evanston Ry.	Specifications, 10 City Cars	439	Feb. 21, 19
"	Vestibule Prepayment Cars for	174	July 25, 19
Geneva, Seneca Falls & Auburn Ry.	Combination Car for Central New York Line	1408	June 20, 19
Houston Elec. Co.	Specifications, 10 Closed Cars	1369	June 13, 19
Ithaca Street Ry.	Specifications, 10 Open & Closed Cars	191	July 25, 19
Jacksonville Traction Co.	Specifications, 15 Closed Cars	1485	June 27, 19
Jersey Central Traction Co.	Specifications, 5 Closed Cars	240	Aug. 1, 19
Manhattan Bridge 3 cent Line	Rolling Stock	334	Aug. 22, 19
" " " "	Specifications, 6 Semi-Convertible Cars	1425	June 20, 19
Memphis Street Ry.	Specifications, 25 Motor & Trailer Cars	954	Apr. 25, 19
Michigan Ry.	All-Steel Cars for	1087	May 16, 19

ent was supplied for cars ordered during 1914

tain ures	Thermo-stats	Window Fixtures	Fare Boxes	Regis-ters	Sanitary Straps	Electric Car Signals	Coup-lers	Fenders and Whlgds	Head-lights	Air Sanders	Trolley Catch's	Venti-lators	Slack Adj't'rs	Anti-Climb-ers	Trolley Bases	Ball or Roller Bearings	Trap Doors	Gear Cases
Co.								H-B			Earll							
											Earll							
							O-B Co.							Rico				
		Edwards		Ohmer			O-B Co.		Esterline									
Co.	Consol		Johnson		Rico	Consol		Lord			Earll			Rico				
																Rollway4		
Co.				Ohmer				H-B										
Co.								Prov			Earll							
Co.					Rico				Esterline									
						Consol			Esterline									
Co.				Sterling		Consol												
Co.		Edwards			Rico	Consol		H-B			Earll			Rico				
Co.						Consol												
Co.	Consol	Edwards	Johnson					H-B	Esterline									
Co.	Consol				Rico	Consol					Earll			Rico				
									Esterline									
Co.							O-B Co.											
Co.		Edwards				Consol												
Co.		Edwards		Sterling		Consol			Esterline		O-B Co.			Rico	O-B Co.			
Co.		Edwards		Sterling		Consol								Rico				
Co.					Rico			H-B	Esterline									
Co.		Edwards					O-B Co.										Edwards	
Co.		Edwards					O-B Co.										Edwards	
Co.	Consol	Edwards		Ohmer	Rico	Consol								Rico				Chil'wth
						Consol				O-B Co.				Rico				
										O-B Co.								
Co.								Prov										
Co.		Edwards									Earll							
Co.		Edwards																
				Ohmer														
	Consol		Johnson			Consol												
	Consol					Consol												
							O-B Co.				Earll							
Co.		Edwards		Ohmer														
Co.	Consol				Rico		O-B Co.							Rico				
				Ohmer														
Co.									Esterline						Lord			
											Earll							
			Johnson	Ohmer														
Co.					Rico	Consol		Prov				Peerless						
	Consol					Consol								Rico				
Co.		Edwards		Ohmer			O-B Co.							Rico	O-B Co.			
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ave appeared in Electric Railway Journal

ars listed in this table

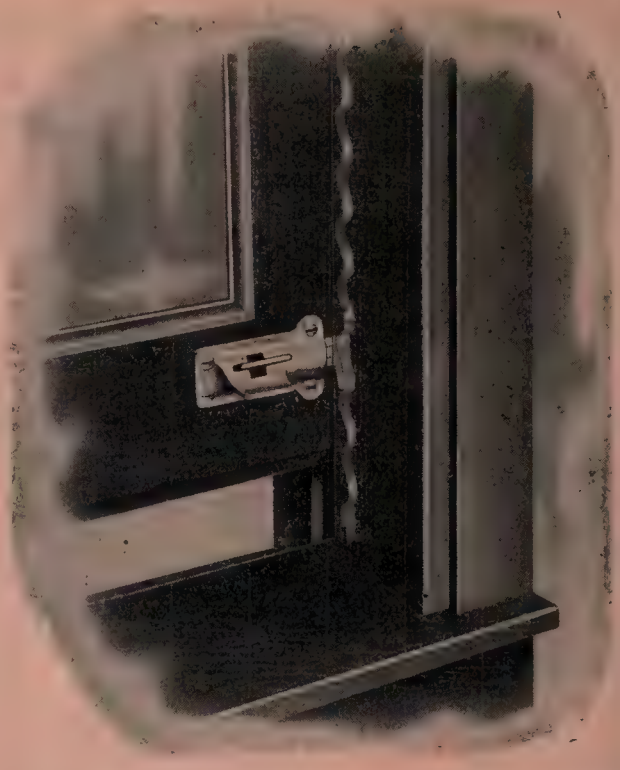
NAME OF ROAD	TITLE OF ARTICLE	PAGE NO.	ISSUE
Michigan United Traction Co.	New Steel Cars for	106	July 18, 1914
Morris County Tr. Co.	Specifications, 10 Closed Cars	1237	May 30, 1914
Municipal Rys. of San Francisco	Specifications, 125 California Type Cars	856	Apr. 11, 1914
New York Municipal Ry. Corp.	The New York Municipal Car—Trucks, Brake, Riggings and Draft Gear	1376	Dec. 26, 1914
" " " "	The New York Municipal Car—Body	1326	June 13, 1914
" " " "	The New York Municipal Car—Design	1261	June 6, 1914
Editorial	The New York Municipal Car	1243	June 6, 1914
New Orleans Ry. & Light Co.	New Cars for	270	Feb. 6, 1915
Niagara, St. Catherines & Toronto Ry.	New Int. Cars for	246	Jan. 30, 1915
Niagara, St. Catherines & Toronto Ry.	Specifications, 6 Int. Cars	751	Mar. 28, 1914
Pacific Electric Ry.	Specifications, 24 Int. Cars	164	Jan. 16, 1915
Pennsylvania R. R.	Passenger Coaches, Motor Equipped	860	April 18, 1914
Phila. & Garretsford St. Ry.	Specifications, 5 Int. Cars	1181	May 23, 1914
Pittsburg Railways	Center-Entrance, End-Exit Cars for	808	Apr. 11, 1914
Portland Eugene & Eastern R. R.	One Man Near-Side Cars	85	July 11, 1914
Puget Sound Traction, Light & Power Co. (Puget Sound Div.)	Light-Weight Cars for	1110	Nov. 14, 1914
Puget Sound Traction, Light & Power Co. (Seattle Division)	Single End Cars	1022	Oct. 31, 1914
Puget Sound Traction, Light & Power Co. (Seattle Division)	Specifications, 12 Closed Cars	805	Apr. 18, 1914
Richmond Light & R. R. Co.	Specifications, 32 Closed Cars	1036	Oct. 31, 1914
St. Louis Southwestern Ry.	Specifications, 8 Gas-Elec. Cars	618	Mar. 14, 1914
Scranton Railway	Specifications, 10 Closed Cars	1369	June 13, 1914
Spokane, Portland & Seattle Ry.	Gas Electric Motor Car	881	Oct. 15, 1914
Sunset Central R. R.	Gasoline Cars for	144	Jan. 17, 1914
Third Ave. Ry.	Single Truck Convertible Car	350	Feb. 14, 1914
" " "	" " " "	731	Mar. 28, 1914
" " "	Specifications, Single Truck Convertible Cars	1485	June 27, 1914
Trenton Bristol & Phila. St. Ry.	Specifications, 5 Closed Cars	191	July 25, 1914
Trenton & Mercer County Tr. Corp.	Specifications, 10 Closed Cars	1181	May 23, 1914
Union Electric Co.	Specifications, 6 Closed Cars	1425	June 20, 1914
United Railways & Elec. Co., Baltimore	Specifications, 85 Semi-Convertible Cars	1065	May 9, 1914
" " "	Enclosed Cars for	86	Jan. 9, 1915
Utah Light & Ry. Co.	Specifications, 24 City Cars	697	Mar. 21, 1914
Washington-Virginia Ry.	Specifications, 5 Closed Cars	1237	May 30, 1914

For the 200 New Cars Ordered by the N. Y. Municipal Railway

EDWARDS SASH FIXTURES

The superior efficiency of their service as demonstrated on the cars of other roads throughout the country naturally led to the selection of Edwards Sash Fixtures for the new lines in Metropolitan New York. For no service are requirements more exacting. In no service is efficiency more important. Under the most trying conditions Edwards Sash Fixtures are trouble-proof and rattle-proof.

Take advantage of this service by specifying *Edwards* Sash Fixtures.



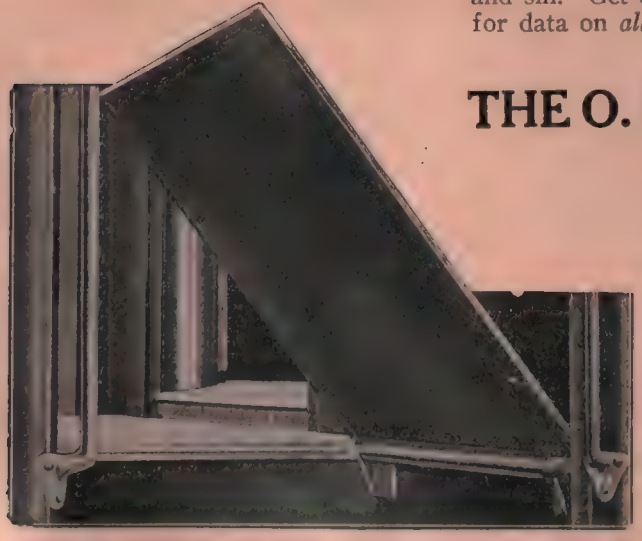
13-0 lock and phantom view of stop bar in operative position

EDWARDS ALL-STEEL TRAP DOORS

Write for Catalogs

are the trap doors of permanent *satisfaction.* Why? Because they don't swell, warp and stick in wet weather as wooden doors often do. They are noiseless in operation and are virtually trouble-proof. Being made of steel they are much stronger and more durable than wood. And—reckoning in the fixtures required with wood doors—they are *cheaper.*

The efficiency and convenience of a trap door is greatly enhanced by the installation of EDWARDS TRAP DOOR LOCKS, which are provided with a powerful starting lever. The pressure on the foot plunger unlocks and raises the door, and the pressure exerted will raise a person standing on the door. These locks are positively automatic and eliminate the hand lift, both on the top of the door and in the platform and sill. Get acquainted with O. M. EDWARDS SERVICE and write for data on *all* our products.



THE O. M. EDWARDS COMPANY, INC.

SYRACUSE, N. Y.

Window Fixtures.
All Metal Sash Balances.
Metal Sash and Mouldings.
Top, Bottom and Side Weather Stripping.
Metal Extension Platform Trap Doors
All Metal Shade Rollers.

7199

CONSOLIDATED

Car Equipment Specialties

NON-CORROSIVE HEATER WIRE
NOKORD
CONSOLIDATED CAR-HEATING CO.
REG. U.S. PAT. OFFICE

The Electric Heater Wire That Won't Corrode

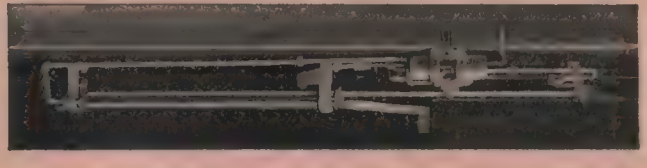
The use of this wire in Consolidated Heaters retains all the efficiency of our old heater coils but yields a much longer life. The new Consolidated Heaters are thus the acme of coil maintenance economy as well as heater efficiency.

Buzzer Signal System



A dependable system for signalling conductor and motormen.
Does away with dry batteries, is always reliable and gives a clear, distinct signal.
Operates directly from trolley voltage.
More than 10,000 equipments in use.
Write for bulletins and list of roads using the system.

Electro-Pneumatic Door Control



Controlled by push buttons.
The engine fits snugly in the door pocket and does not occupy valuable space in the car.
Door is always under the control of the gateman and can be closed without slamming, in 1¼ seconds.
Write for bulletins and for list of roads using this control.

CONSOLIDATED CAR-HEATING CO.

ALBANY NEW YORK CHICAGO

7171-P


AGASOTE
PANTASOTE CURTAINS
PANTASOTE CURTAINS
PANTASOTE MOTORMANS CURTAIN
YOUR KODAK MAN SUSSMAN
Agasote Headlining—Pantasote Curtains on new prepayment cars of The United Railways & Electric Co., Baltimore
Pantasote Company
NEW YORK
Chicago San Francisco Montreal
Pantasote Curtains—Agasote Headlining have been specified on all of the leading car orders of 1914.

On the Big Car Orders Last Year

—Boston Elevated, 100 Cars.

—Chicago Surface Lines, 228 Cars.

—Munic. Rys., San Francisco, 125 Cars.

—New York Municipal Railway, 200 Cars.

—on these and on the small car orders for the year our hand brakes were specified to the tune of more than

Two thousand five hundred sets.

This does not take into consideration the hundreds of sets of Peacock Improved brakes that were ordered and applied to old cars which formerly carried antique hand brakes.

It points out the modern tendency toward efficiency in hand brakes by the roads that study and practice efficiency methods.

It is a tribute to the product of the

National Brake Co.

888-890 Ellicott Sq., Buffalo

Fare Collecting Devices should not be CAR Equipment





The Rooke Register is MAN Equipment

The subject of car equipment now being uppermost, it is opportune to consider fare collection as applied to car equipment.

Most systems become a part of the car and may be rightly considered car equipment.

The Rooke System is *not* car equipment, but rather man equipment, and that is why it is more *flexible* to meet operating and loading needs than any system which becomes part of the car.

The only *inflexible* part of the Rooke Register is *fare registration.*

In this it is always thorough and accurate, based upon a man-to-man exchange between conductor and passenger.

In other respects, too, the Rooke System is far in advance of car equipment devices because there are no charges for interest, depreciation or maintenance connected with it—no appliances necessary to operate it.

Every cent paid for the Rooke System is paid for *Service,* and any improvement which may later be made in the system immediately becomes a part of *your* system, at no extra cost.

The system is leased on a basis whereby we take care of all repairs and replacements.

In other words, the uncertainty of *eventual* cost is entirely eliminated in the Rooke System. It is a known uniform charge which amounts to only a percentage of the actual money it saves.

You install the system, on all types of cars you operate, without the expenditure of a penny and without loss of a minute in preparing the cars to receive the system and without friction from employees or the public.

Get all the facts—and the viewpoints of users.

Write us for them.

Rooke Automatic Register Co.

Providence, R. I.

Our 1914 Cars



Recently a noted financier stated that there were three requisites for a man's success: honesty, education and thrift. These same requisites can be applied to the success of a manufacturing institution; HONESTY to cover good workmanship and materials; EDUCATION to cover versatility of construction and THRIFT to get the business. Our honesty is proven by our duplicate orders; our education is proven by the different types of cars that we have constructed; our thrift is proven by the record we have made by not having our plant closed a single day for the past two years, for the want of orders.

Let us have your specifications and inquiries.

Southern Car Co., High Point, N. C.

42 Per Cent

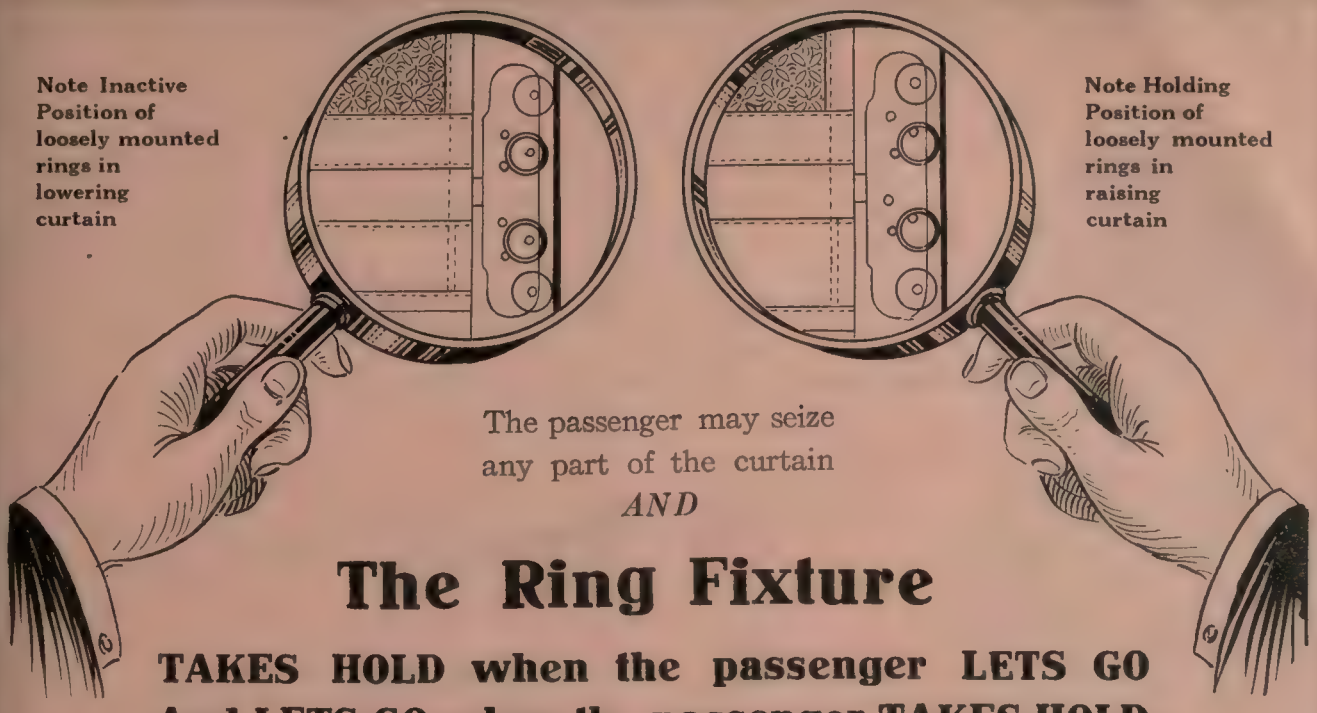
of the all-steel cars ordered during 1914 for electric traction service were "Cincinnati" Cars.

It is a noteworthy fact that the Cincinnati Car Co. was awarded orders for a majority of the cars of this type built—in this—the most important year in the advance of all-steel cars.

The Cincinnati Car Co.

Winton Place

Cincinnati, Ohio



The passenger may seize any part of the curtain
AND

The Ring Fixture

TAKES HOLD when the passenger LETS GO
And LETS GO when the passenger TAKES HOLD

The Result:

The curtain stays in the groove when being raised or lowered
Remains level and holds fast in any set position

THOSE ARE THE REASONS WHY

83% of All the Cars Purchased by Electric Railways in 1914 Were Equipped with The Ring Fixture!

(See Pages 80-87 Statistical Section of this issue)

Write for This Bulletin
(It shows you "How" and "Why")

Ask for "C-3"



The action of this fixture in operation is as near the automatic as can be obtained.

In pulling down the curtain the loosely mounted rings simply roll back away from the groove and allow the pull to overcome strong roller spring tension. (See illustration at left.)

On the raising of the curtain, loosely mounted rings assume a wedging position, thus neutralizing the upward pull of the roller spring and tending to keep the curtain squarely in grooves.

This wedging action is sufficiently strong to hold curtain in any set position.

The Curtain Supply Co.

322 West Ohio Street, Chicago

48 Church Street, New York



No Prepayment Car is complete without a

JOHNSON Registering Fare Box

IN PROOF OF THIS:—

Sixty leading railway systems are more efficient.
Sixty leading properties load their cars 20% faster.
Sixty leading operating boards are enthusiastic.
Sixty sets of leading railway executives are satisfied.
Sixty leading operating engineers are convinced.
Sixty big "leaks" have been stopped up tight.
Sixty leading systems are getting increased receipts.
Sixty leading roads are giving us repeat orders.

JOHNSON FARE BOX COMPANY

30 CHURCH STREET
NEW YORK

JACKSON BOULEVARD AND ROBEY STREET
CHICAGO

The Ohmer System

Throw your burden of worry about fare protection upon our shoulders.

We have concentrated our attention for years on such matters. The Ohmer System is the result. It is a plan which has made good in the Electric Railway industry. It stands for an idea based on truth and applied practically to the relation between manager and man.

We can tell you off-hand how the general plan can be applied, but we want to know just what your local difficulties are, so we can go into every detail with you. You will be under no obligation to us whatever for anything we do, and you will possibly be able to add something to your knowledge of the subject from our experience.

Our methods are being applied successfully to meet the most difficult situations.

The continued and growing success of our business, and the rapidly increasing number of our clients are proof that we can help you if you will let us.

We manufacture a large variety of practical fare accounting mechanisms, but more important than the mechanism is the basic idea of the Ohmer System.

Let's get together and co-operate.

Ohmer Fare Register Co.

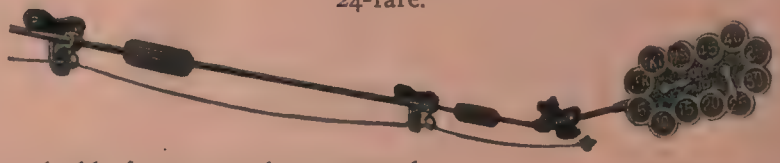
Dayton, Ohio

The Three Big Dayton Leaders

NO. 1



Dayton Computing Fare Recorders for City, Suburban and Interurban Service.
Made in the following standard sizes:
4-fare, 6-fare, 8-fare, 10-fare, 12-fare, 15-fare, 18-fare, 20-fare and 24-fare.



All Dayton Recorders are guaranteed *right* in design and construction.

The double-dial fare indicators are a valuable feature, as they constantly attract attention when fares are being registered, making both public and private inspection easy and effective.
By the Dayton System every fare is indicated as paid, is registered and recorded as indicated and is as effectually checked and verified by the double system of recording as money paid in bank.

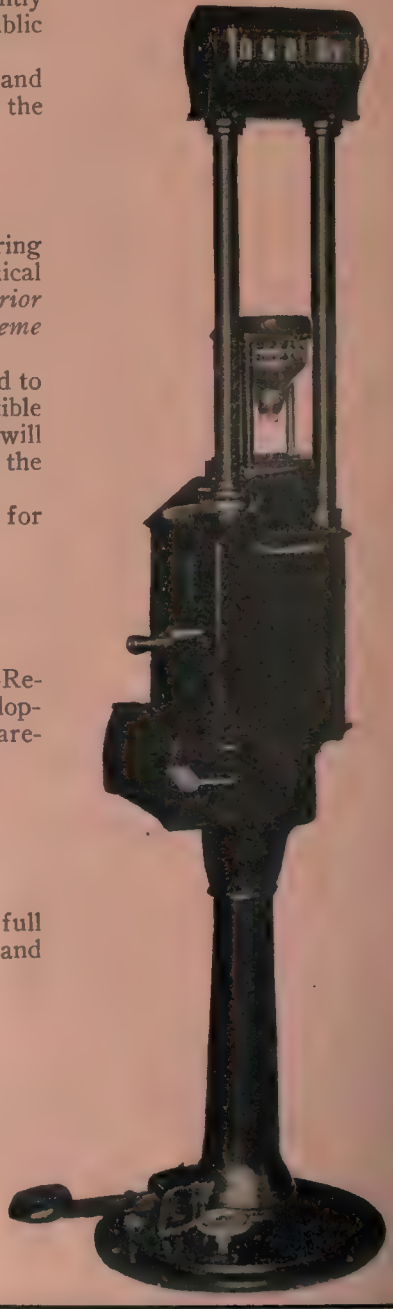


NO. 2

The Dayton standard DB registering Fare Box is a masterpiece of mechanical construction—*right* in design—*superior* in material and construction—*supreme* in service.
Every Dayton Fare Box is guaranteed to be practically infallible and indestructible under normal conditions of use and will give years and years of service at the very minimum of maintenance cost.
Ask us to send you a sample box for your examination and trial.

NO. 3

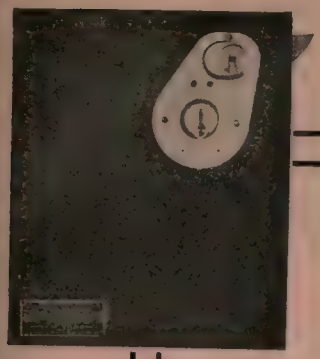
The Dayton Combination Fare Box-Recorder is the full and logical development of the fare box method of fare-getting and fare handling:
All cash fares registered through the fare box.
All fares indicated and registered.
Indisputable records obtained of the fare collections.
No figure drudgery.
No arguments in settlement.
No money-losing errors in trip sheet footings and extensions—but full collections, full settlements, and a *square deal* for both company and employees.



Write today for information regarding the type of fare register equipment in which you are interested.

The Dayton Fare Recorder Company

Dayton, Ohio





Get the Concrete Facts
on
Coasting Recorders

1. How you cannot afford to operate cars without **Coasting Recorders.**
2. How they will pay for themselves out of their own economies effected.
3. How we will finance the purchase of **Coasting Recorders** during the present financial condition.

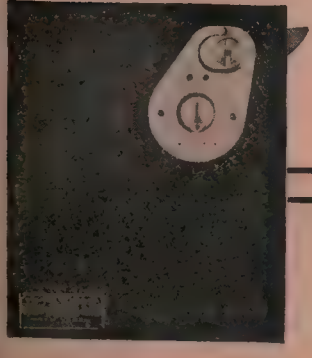
Another prominent railroad adopts

COASTING RECORDERS

Northern Texas Traction Co., Fort Worth, Texas
Stone & Webster, Management
Just placed an order for a complete equipment of Coasting Recorders for all its 183 Cars

Railway Improvement Company
61 Broadway, New York

Chicago Los Angeles London

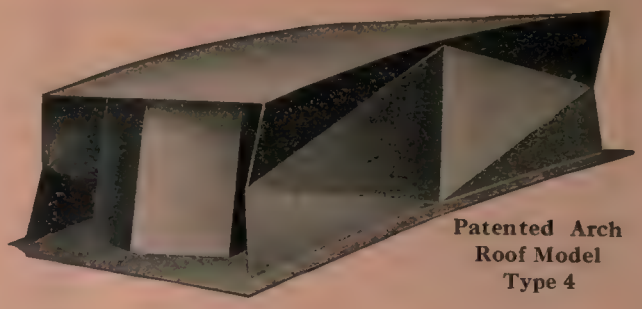




Peerless Ventilators

For

Arch and Monitor Roof Cars



Patented Arch Roof Model Type 4



Its positive exhaust freedom from down drafts makes the Peerless the modern ventilator for the modern car.

How to Properly Ventilate Monitor Roof Cars

Simply Close Up the Deck Sash and Install the Peerless Ventilator as Shown

The change is quickly and easily accomplished—The cost per car very low—The result: Proper ventilation automatically provided at all times without the discomforts of down drafts, or dust, dirt, rain, snow, etc.





Patented Monitor Roof Type 4
Phantom View Showing Interior Construction

The adoption of the Peerless by our foremost Electric and Steam roads for both old and new cars is the best evidence of its efficiency.

Complete information upon request.

Auto Utilities Mfg. Co.

SOLE MAKERS

514-524 Insurance Exchange Bldg.

CHICAGO, ILL.

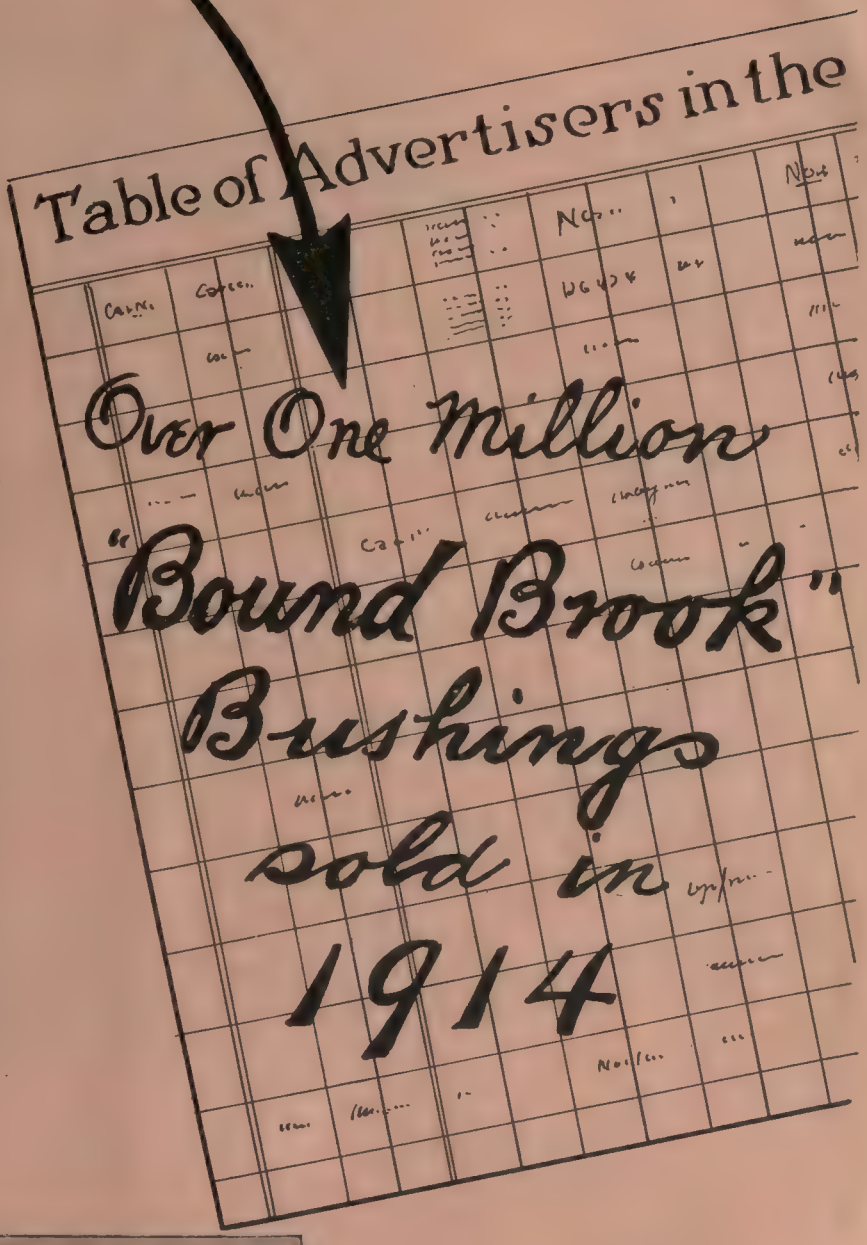
Add this to Your Statistical Table

The individual consumption of "Bound Brook" Bushings by the electric railways during 1914 is not listed in the table published in this issue of the "Electric Railway Journal" because our bushings are handled through the intermediary of so many supply houses.

Practically all of the large roads listed in the table are, however, users of "Bound Brook" Bushings, and during 1914 their purchases of these high efficiency bushings aggregated over 1,000,000 bushings.

All genuine Graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the United States of America.

Insist on the **genuine.**



BOUND BROOK

Specify the NEW "Bound Brook" Bushing—its new feature is your protection

Trade Mark Reg. U. S. Pat. Off.

Graphite Lubricating Co.

Bound Brook, N. J.

SAFETY FIRST



STOP, LOOK, LISTEN!

"Safety First" Card Supplied to Chicago School Rooms

"Safety First" on the Chicago Surface Lines

is more than a figure of speech. A very comprehensive Safety Publicity Campaign has been and is being conducted with great energy and ability by Mr. H. L. Brownell, Safety Inspector of the Chicago Surface Lines.

But not only upon publicity do the surface lines depend for safeguarding the public. Many will be taught to avoid danger, but *some* will run before approaching cars—some will be *struck*—and *only the Safety devices applied to the car* can save the life at hazard. That is why the Chicago Surface Lines back up their campaign by having their cars

Completely Equipped with

H-B LIFE GUARDS

That is why the traction systems of New York, Brooklyn, Philadelphia, Buffalo, Newark, are *completely equipped* with H-B Life Guards. That is why over 100,000 cars in the United States are equipped with Providence Fenders or H-B Life Guards. That is why over 200 foreign roads use H-B Life Guards. The public is awakened to the need for adequate protection from street car accidents. H-B Life Guards afford maximum protection at a minimum cost to you. Write for data.

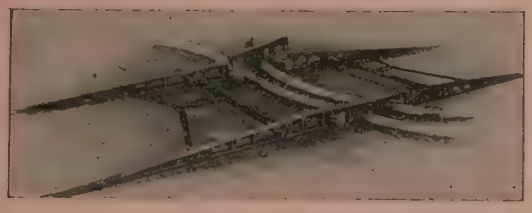
The Consolidated Car Fender Co., Providence, R. I.

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

General Sales Agents

7198



Fire Hose Bridge



Tomlinson Automatic Couplers—Patented



Trolley Retriever
Patented

O-B Car Equipment Materials



Electric Signals



Chime Whistle

were designed by practical and experienced men.

Before designing, careful investigations were made of the requirements of the trade. Suggestions were obtained from many railway men.

Thorough tests in service were made on every device before it was offered for sale.

The result—a line of devices thoroughly in keeping with the O-B watchword

"Quality First"

Look in Catalog No. 14 for Full Details



Lighting Regulator
Pat Applied For



Trolley Catcher
Pat. Applied For

THE OHIO BRASS CO., Mansfield, Ohio



Whistle Valve



Trolley Base—Patented



Diaphragm Sander Valve—Pat.



Trolley Wire Pick-Up
Pat. Applied For

1914 Was a Wonderful Year for

Railway GOLDEN GLOW TRADE MARK REG. Headlights



SR-95, SM-95—For city and suburban cars



SE-95—For city and suburban cars



L-128—For locomotives

1200 Per Cent More Railways are using Golden Glow "Safety Illumination" headlights now than twelve months ago. The successes achieved in that time by Golden Glow headlights have been unparalleled in the records of front-end illumination.

Now Over 160 Progressive properties are lighting their roadways for hundreds of feet ahead by Golden Glow lamps, and have discarded wasteful and inefficient apparatus.

A Year Ago Only a Few had realized the economy and efficiency of this equipment. The advance of Golden Glow installation has witnessed the relegation of arc lights and incandescents giving only 35 feet of light to the storeroom or to "useless stock."

The List of Purchasers of Golden Glow headlights for new cars is only a small portion of the number who adopted them during 1914. The great majority purchased Golden Glow lamps last year to bring existing rolling stock up to date.

During January, 1915, the shipments of Golden Glow lamps, and the orders for February and March delivery, total exactly 47 per cent. of the entire 1914 business.

The ESTERLINE Co.

219 East South Street, Indianapolis

Will Your Property

in 1915 be one to secure greater illumination and to save real money—elimination of repair costs, reduction of maintenance, prevention of accidents, increase of efficiency—by the adoption of Golden Glow?

Send for Catalogue and Trial Offer. Representatives in all principal cities.



T-128—For interurban cars

Are Your Cars on the List?

55%

of all city and interurban passenger motor cars purchased during 1914—in the United States and Canada—were equipped with the

Chillingworth Seamless
Drawn Steel Gear Case

Doesn't this Record Indicate Merit?



CHILLINGWORTH JERSEY CITY PLANT
is the largest plant in the United States devoted exclusively to the manufacture of Gear Cases.

We are Gear Case Specialists and will solve your problems if you will submit them.

Convince Yourself

By an examination and test—which you can do without spending any more money than you are now paying for steel cases—you have nothing to lose and everything to gain in the investigation of a case we claim will eliminate bracket and rivet trouble—ask those who are using hundreds of them. We will send you a list, if requested.

Thayer & Company, Inc., Agents

111 Broadway, New York City

REPRESENTATIVES:

U. S. Metal and Mfg. Co., New York.
Allen General Supplies, Canada.
H. F. Keegan & Company, Chicago.
Grayson Railway Supply Co., St. Louis.
W. R. Garton Company, Chicago.
Union Electric Company, Pittsburgh.



While you are urging your men to coast more

don't forget that

ROLLWAY BEARINGS
increase coasting time

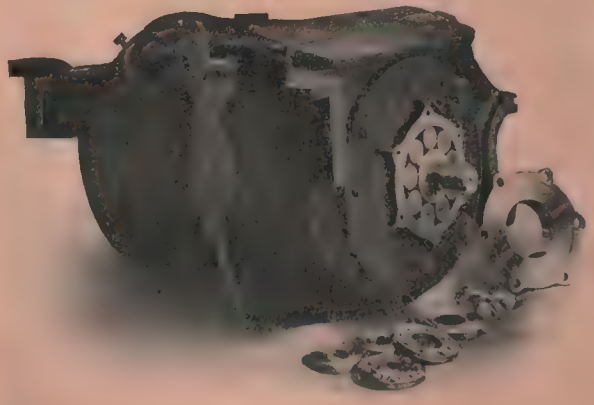
Many roads have found that the coasting time records of their cars equipped with Rollway Bearings have been much better than those of cars having plain bearings. The difference is of course due to the large degree in which Rollway Bearings reduce friction.

This means a considerable saving in power consumption.

Besides, Rollway Bearings effect a very substantial saving in lubrication.

They cut the cost of wheel maintenance, too, by reducing flange wear.

In the aggregate these savings amount to a figure you can't afford to overlook. Let us prove it by quoting facts on Rollway Bearings from actual service records.



Railway Roller Bearing Co.
Syracuse, N. Y.

7162

Take Your Choice

from the two latest and most improved Hand Power Brakes yet designed

Lord Differential Staffless Brake

The old mechanical principle of the differential has in its application to car braking solved the most exacting of modern car design requirements.

Adequate power furnished for heaviest cars.

Only 6½″ space taken from dash sheet on platform; beneath crown piece chain alignment can be confined to a depth varying from 1″ to 5″.



A vertical wheel application without bevelled gearing.

Power mechanism above platform, away from mud and dirt.

An automatic pawl in lieu of ordinary ratchet dog greatly increases efficiency of operator.

An automatic stop which is adjustable.

Pressed steel case; bronze bearings; light in weight, yet inexpensive.

Giant Perfected Brake

A geared brake furnished with two-to-one, three-to-one and four-to-one ratios.
Weighs only 45 pounds. The lightest yet strongest geared brake yet designed.

Requires less space below platform than any other geared brake.
Automatic oiling provision for both pinion and gear shafts; an exclusive feature.
Patented method of quick take-up of chain has proved to be most effective of various quick take-up schemes.



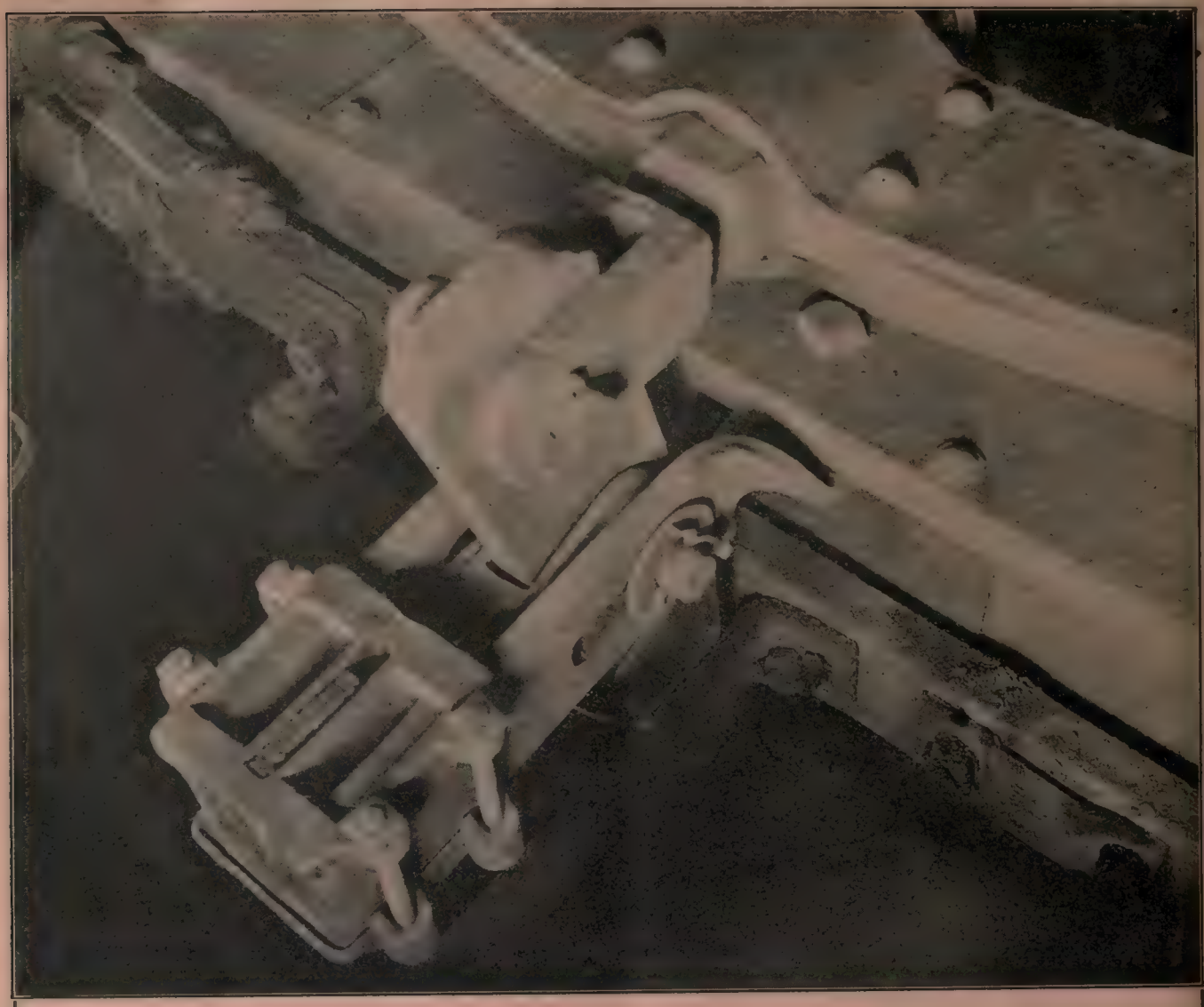
No lost motion when applying brakes by reason of novel patented automatic stop. (A pawl in gear drum operates through spiral cast in roof of housing against stop block.)
More power at a given gear ratio than any other geared brake.

Three types of drum are offered; also a new special design for installation at center of stepless, center entrance cars.

Lord Manufacturing Company

105 W. 40th St., New York City

We sell Service
Call on our engineers to assist in solving your brake problems
"THE RAILWAYS BE PLEASED"



When Studying the Statistical Table

note the representative class of roads for the cars of which—both city and interurban—S. W. B. Automatic Shim Slack Adjusters were specified. This includes the 200-car order of the New York Municipal Railways, for which the very severe service requirements demand the highest type of equipment. The

S. W. B. Automatic Shim Slack Adjuster

The S. W. B. automatically takes care of brake-shoe clearance and wear on the rigging.

This means: Shoes last longer—saving shoes and mechanics' time. Brakes are sure to act quickly—no excessive slack to take up. Cars "handle" all alike—motormen always know where to "find their brakes." Increased life of brake rigging—due to shorter brake travel.

As slack occurs the metal shims drop into place under the fulcrum of the brake lever, maintaining the correct gap between brake shoe and wheel.

The S. W. B. Slack Adjuster does away with brake adjustment troubles completely. Write for proof.

The Sauvage-Ward Brake Co., Inc.

Whitehall Bldg., New York

7186

PREPAYMENT PROGRESS

In calling attention to the following list, it is pointed out that the present remarkable success of the Prepayment system has been the result of much work, inventive genius and unstinting expenditure whenever necessary to experiment, to improve on old models or to acquire new ideas.

The list of United States patents which follows is evidence of how securely the strength of the Company's position is maintained.

PREPAYMENT PATENTS.

Date of Issue.	Number	Date of Issue	Number
May 17, 1898	604,128	Oct. 26, 1909	937,870
Feb. 14, 1899	619,350	Oct. 26, 1909	938,037
Oct. 16, 1900	659,699	Nov. 9, 1909	939,899
May 20, 1902	700,375	Nov. 30, 1909	941,807
Sept. 26, 1905	800,172	Jan. 4, 1910	945,666
June 18, 1907	857,332	Jan. 11, 1910	945,964
Nov. 5, 1907	870,051	Feb. 15, 1910	949,131
Jan. 7, 1908	875,740	Feb. 15, 1910	949,717
Oct. 20, 1908	901,786	Feb. 22, 1910	949,877
Oct. 20, 1908	901,787	Feb. 22, 1910	949,878
Oct. 20, 1908	901,902	March 1, 1910	951,040
Oct. 20, 1908	901,903	April 12, 1910	954,592
Oct. 27, 1908	902,368	April 12, 1910	954,908
Oct. 27, 1908	902,381	May 10, 1910	957,639
Oct. 27, 1908	902,405	July 5, 1910	963,722
Nov. 24, 1908	905,100	Aug 16, 1910	967,245
Dec. 1, 1908	905,665	Nov. 29, 1910	976,924
Dec. 29, 1908	908,199	Nov. 29, 1910	976,926
Feb. 9, 1909	911,987	Aug. 29, 1911	1,001,942
Feb. 9, 1909	912,019	Aug. 29, 1911	1,001,943
Feb. 16, 1909	912,792	Aug. 29, 1911	1,001,944
March 2, 1909	913,773	Aug. 29, 1911	1,001,988
March 2, 1909	913,853	Aug. 29, 1911	1,001,989
April 6, 1909	917,607	Aug. 29, 1911	1,001,990
April 13, 1909	918,344	Aug. 29, 1911	1,002,027
April 27, 1909	920,062	Aug. 29, 1911	1,002,028
May 4, 1909	920,183	Aug. 28, 1911	1,002,029
May 18, 1909	922,395	Aug. 28, 1911	1,002,030
May 18, 1909	922,430	Aug. 29, 1911	1,002,031
June 8, 1909	924,420	Aug. 29, 1911	1,002,180
June 22, 1909	925,786	Jan. 16, 1912	1,014,907
Aug. 17, 1909	931,724	July 15, 1913	1,067,681
Aug. 24, 1909	931,224	Sept. 23, 1913	1,073,930
Sept. 14, 1909	934,350	Jan. 27, 1914	1,085,255
Oct. 5, 1909	935,853	March 3, 1914	1,088,936
Oct. 5, 1909	935,929		

In addition to the above, there are forty-six applications covering further improvements pending in the Patent Office at Washington—further evidence that we are constantly investing energy and capital in the interests of our customers and the electric railway industry as a whole.

The Prepayment Car Sales Company owns or controls the patents which cover all forms of practical fare prepayment cars, and grants a license to Car Builders and Railway Companies for the building and operation of such cars.

Prepayment Car Sales Company

50 Church Street, New York

Cut Down Overhead Charges on Your Cars



Bayonne Car Roofing on Car of Pacific Electric Railway, Los Angeles, Cal

with

BAYONNE CAR ROOFING

26″ to 120″ wide

It's *waterproof.*

It's not ordinary duck, painted.

It's specially prepared CANVAS—*treated.*

Paint cracks, peels off, exposing the fabric beneath to the deteriorating effects of sun, snow, rain.

BAYONNE CAR ROOFING LASTS. It defies the elements.

For over eight years BAYONNE Car Roofing has been giving satisfaction. It is used on many of the largest steam and electric roads, which have adopted it after severe tests.

Cut down the *overhead* charges on your cars by adopting BAYONNE CAR ROOFING.

Specify it for your new cars—USE it when remodelling. We will be glad to send you a sample book and to quote prices. When writing please specify Price List J-40.

John Boyle & Co., Inc.

112-114 Duane Street New York City 70-72 Reade Street

Branch House, 202-204 Market St., St. Louis, Mo.

Wide Cotton Duck

Largest Stock and assortment in United States

Also headquarters for Cheesecloth and Bunting

7142

We are having quite a run on our

Journal and Motor Brass Bearings

and of course we are pleased to see the way they have taken a hold on the trade.

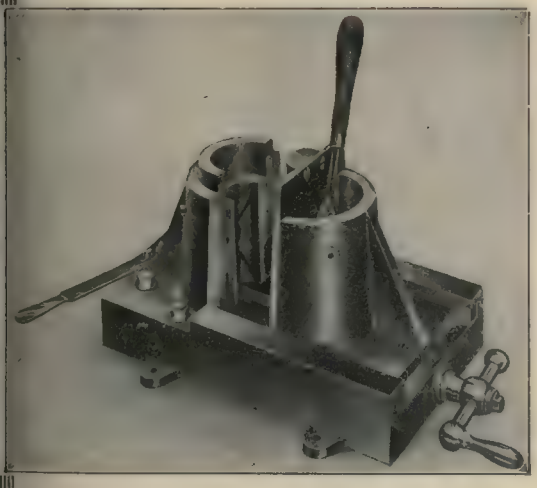
But it stands to reason, doesn't it, that the quality and efficiency of these bearings is the basis of their success just as that is true of any other successful product.

If you are not already taking advantage of the superior economy of Columbia Journal and Motor Brass Bearings, now is a good time to begin. Certainly, *investigate* their service records; study them from every angle. The *first* thing to do is to send for the Columbia Bulletin.

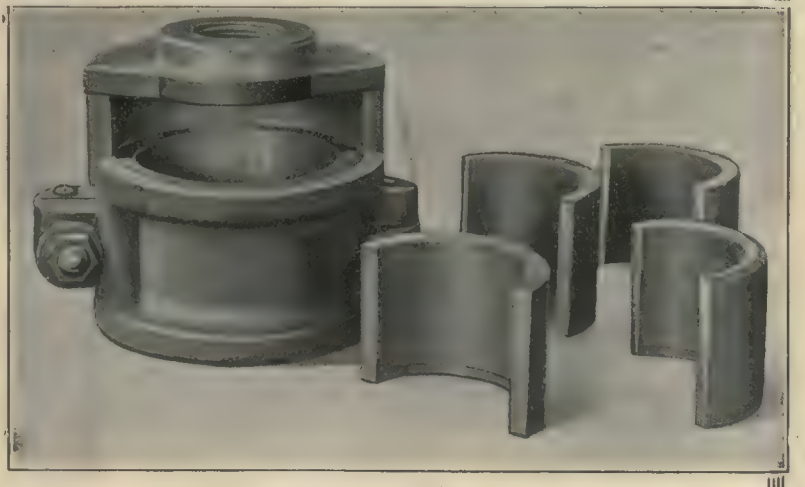
Probably there will be *some* of your old bearings that you prefer to nurse along awhile before replacement. In that case the

Columbia Rebabbitting Moulds and Lathe Chucks will help you get a lot more Service out of your old bearings

With this outfit you can quickly, easily and economically repair your old wornout bearings, restoring to them their original efficiency.



Columbia Rebabbitting Mould



Columbia Lathe Chuck

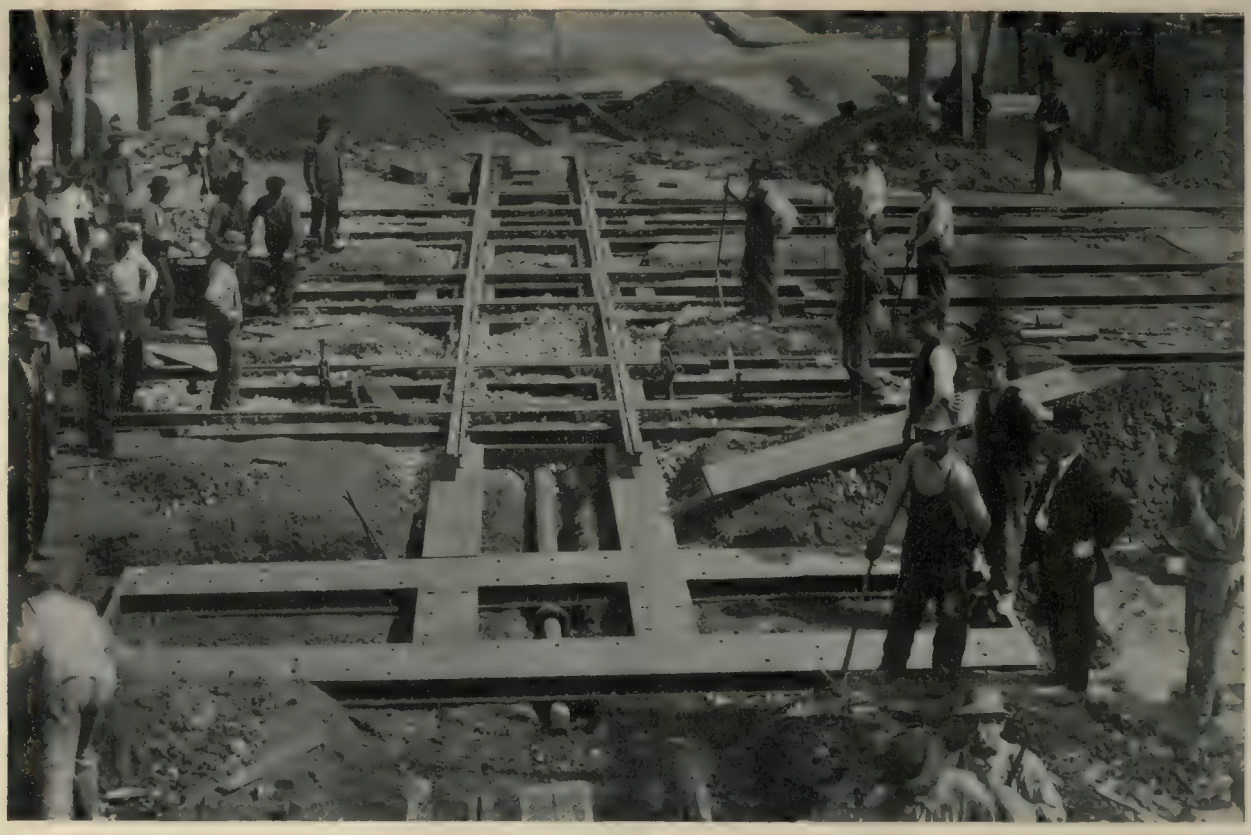
Get Columbia Bulletins on these Columbia Shop Cost Cutters:

Axle Straighteners.
Bearings for Armatures and Axles.
Armature Stands, Armature Buggies.
Car Hoists, Car Replacers.
Brake Appliances, Handles, Forgings for Rigging, etc.
Babbitting Moulds, Lathe Chucks.
Coil Winding Machines for field and armature coils
Coils for Armatures and Fields.
Coil Taping Machines for Armature Leads.
Rolls for Flattening Leads of Armature Coils.
Car Trimmings, Car Signs—Day and Night.
Banding and Heading Machines.
Pinion Pullers, Trolley Poles—Steel.
Commutators, Controller-Handles, Door Locks.
Gear Cases—All Steel and M. I., Pit Jacks.
Grid Resistances, Signal or Target Switches.
Trolley Wheels, Tension Stands.
Track Special Work, N. W. Cartridge Fuses.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

71013



Installed July, 1912
Maintenance to Date: ZERO

Two and a half years' service and not a dollar spent for maintenance since the above steel crossing foundations were laid. What would the same length of time have done to wooden tie construction?

INTERNATIONAL STEEL CROSSING FOUNDATIONS

mean that your crossings are supported in their *entirety;* the rocking and sagging of wooden tie construction is entirely eliminated and the consequent breaking avoided; the great bearing area reduces maintenance charges to a minimum far below the best possible performance of wood ties. In the extra life added to the crossing, International steel crossing foundations save *double their cost.*

These foundations are saving money and bettering service for leading railways throughout the country and some of the largest roads are rapidly extending their use on their lines. Make a trial installation on your hardest worked crossings. Send details of requirements and get list of users. See what they say.

International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.

Western Eng'g Sales Co., Seattle, Wash. Portland, Ore.

R. J. Cooper Co., Salt Lake City, Utah

J. E. Lewis & Co., Dallas, Texas.

Maurice Joy, Philadelphia.

William H. Ziegler, Minneapolis, Minn.

711



The McGUIRE-CUMMINGS Car Building Service

can demonstrate its value to you not only from the Engineering and Construction standpoint but in the highly important essential—COST.

Send us your inquiry for whatever you have in contemplation, and we shall be pleased to place at your disposal an advisory and co-operative service the decided value of which has been acknowledged by hosts of our clients.

The McGuire-Cummings' method of building cars is:

1st: To carefully analyze the traffic conditions and problems to be met, and to then design the cars to fully suit the individual requirements in each case.

2nd: To produce only well built cars of substantial construction, based on the most advanced engineering practice—cars which will render maximum of service at a minimum of cost.

You may find it decidedly profitable to confer with us relative to your 1915 requirements.

McGuire-Cummings Mfg. Company

General Offices—Harris Trust Building, Chicago

Builders of City and Interurban Cars and Trucks, Work Cars, Sprinklers, Snow Sweepers and Plows, Baggage and Express and Combination Cars.



SEARCHLIGHT SECTION

FOR SALE

10—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
30—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Trucks.
2—Jackson and Sharp 18′ Bar Bodies.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
10—Wason 10 Bench Open Cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 Bench Open Cars, West. 12A Motors, Brill 21E Trucks.
8—Brill 14 Bench Open Cars, West. 56 Motors, Brill 22-E Trucks.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars complete, 4 G.E. 1000 motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
20—G.E. 80 Railway Motors complete.
12—G.E. 54 Railway Motors complete.
60—G.E. 1000 Railway Motors complete.
60—G.E. 800 Railway Motors complete.
40—West. 12A Railway Motors complete.
32—West. 49 Railway Motors complete.
8—West. 38B Railway Motors complete.
10—West. 112 Railway Motors complete.
4—West. 68-C Railway Motors complete.
4—West. 68 Railway Motors complete.
12—G.E. 73 Railway Motors complete.
24—G.E. 87 Railway Motors complete.
20—G.E. 57 Railway Motors complete.
3—West. 101-B2 Armatures, brand new.
3—West. 93-A2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
22—K6 Controllers.
44—K11 Controllers.
28—K2 Controllers.
62—K10 Controllers.
30—K14 Controllers.
28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheel base.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheel base.
10—Dupont Trucks, 7′ 6″ wheel base.

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2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.

2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

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One double truck, single track snow plow, length over all 40 ft., width 8′6″, height 10′9″, truck centers 13′8″, wheel base 4′. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

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Complete with coupling and panel.

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1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers;
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
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Can also furnish transformers—all voltages.

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5—Type M, Single End Control for 4 motors, 75 H.P. ea.
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Try Journal "Positions Vacant" columns for high grade assistants.
Get your Wants into the Searchlight

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CAR painter—A competent and thoroughly all around mechanic, best of references, good worker, efficient in handling men, or will work under good fireman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

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MAN, 37, accustomed to handling material accounts, job costs, payrolls, distribution sheets, etc., wishes position with street or interurban electric road. Address Box 673, Elec. Ry. Jour.

MANAGER—General superintendent, purchasing agent. Position with medium sized railway or combined railway and light plant. Good practical experience in construction and operation. Good references. Box 663, Elec. Ry. Jour.

MASTER mechanic open for immediate engagement. Long experience, reliable and unquestioned ability. Best references. Box 671, Elec. Ry. Jour.

POSITIONS WANTED

POSITION wanted by young man with valuable electric railway experience embracing all activities of way department, together with valuation work. Investigations of traffic conditions, service, and fare regulations, etc. Best of references. Box 664, Elec. Ry. Jour.

PRACTICAL engineer, many years' experience, seeks position as General Supt., supt. motive power or master mechanic; wide experience all branches both mechanical and electrical from power house to track, including operation; expert in car design and maintenance; best references. Box 662, Elec. Ry. Jour.

STOREKEEPER, thoroughly acquainted with all electric railway material and accounts, desires change. Can cut the mustard in regard to efficiency and economy. Box 674, Elec. Ry. Jour.

SUPERINTENDENT of equipment or master mechanic desires position. At present in charge of a first class road but desires to change. Have had 18 years' experience on city elevated and high speed interurban. Good organizer and equipment manager, thoroughly up to date on all types of equipment. Best of references. Box 661, Elec. Ry. Jour.

YOUNG man desires position as auditor of electric railway company. At present so employed. Best of references. Box 679, Elec. Ry. Jour.

POSITIONS VACANT

WANTED—A salesman who has had experience in selling friction tape and insulating compounds. Address Box 677, Elec. Ry. Jour.

WANTED—Bookkeeper, young man, to take charge of set of books of street railway company; must have had previous experience and be able to furnish satisfactory references. Give both in application. Address Box 668, Elec. Ry. Jour.

WANTED—Good experienced foreman on heavy catenary or trolley construction. Apply in person or by writing, giving experience, to M. J. Griffith, Supt. Const., Gibbs & Hill Consulting Engrs., Bluefield, West Virginia.

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Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

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READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Service.
Prest-O-Lite Co., Inc., The

Advertising, Street Car.
Collier, Barron G., Inc.

Air Cleaner.
Lord Manufacturing Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
American Vanadium Co.

Amusement Devices.
Este Co., The J. D.

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

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Railway Improvement Co.

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Brill Co., The J. G.

Axle Straighteners.
Columbia, M. W. & M. I. Co.

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Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
Hadfield's, Ltd.
McGuire-Cummings Mfg. Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Motor Truck Co.
Standard Steel Works Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

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American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
International Register Co.
Western Electric Co.
Woodman Mfg. & Sup. Co., R.

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Coal & Iron National Bank.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carb. & Bat'ry Co.
Protective Signal Mfg. Co.
Stackpole Carbon Co.
Western Electric Co.

Batteries, Storage.
Edison Storage Battery Co.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Engrg. Co.
Columbia, M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
Post & Co., E. L.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Loco. Works.

Bearings, Oilless, Graphite, Bronze & Wooden.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.
S K F Ball Bearing Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
National Tube Co.
Protective Signal Mfg. Co.
Reiter, G. C.
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Trolley Supply Co.
Western Electric Co.

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Jeffrey Mfg. Co.

Belting.
Jeffrey Mfg. Co.

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Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Sup. Co., W. A.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Blow Torches for Soldering and Brazing.
Prest-O-Lite Co., Inc., The.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Tubes.
National Tube Co.

Bond Testers.
American Steel & Wire Co.
Lord Manufacturing Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.

Bonds, Rail.
American Steel & Wire Co.
Elec. Ry. Improvement Co.
Electric Service Supplies Co.
Electric Ry. Equipment Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Lord Manufacturing Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

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Kilby Frog & Switch Co.
Weir Frog Co.

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Electric Service Supplies Co.
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Ohio Brass Co.
Lindsley Bros. Co.
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Sauvage-Ward Brake Co.

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Amer. Brake Shoe & Fdy. Co.
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National Brake & Elec. Co.
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Goldschmidt-Thermit Co.
Indianapolis Switch & Frog Co.
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Prest-O-Lite Co., Inc., The.
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Bridges and Buildings.
American Bridge Co.
Brown Hoisting Mach. Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.
Zelnicker Sup. Co., W. A.

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Jeandron, W. J.
Morgan Crucible Co.
Nungesser Carb. & Bat'ry Co.
Speer Carbon Co.
Stackpole Carbon Co.
Western Elec. Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Elec. Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal.
American Bridge Co.
Brown Hoisting Machinery Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—see thoses headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Jones' Sons Co., J. M.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Southern Car Co.
United Electric Car Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

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Falk Co., The.
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Long Co., E. G.
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St. Louis Steel Foundry.
Standard Steel Works Co.
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Jeffrey Mfg. Co.
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St. Louis Car Co.

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Elec. Service Supplies Co.
Long Co., E. G.
Lord Manufacturing Co.
New Haven Trolley Sup. Co.
Trolley Supply Co.
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Wood Co., Chas. N.

Ceiling, Car.
Keyes Products Co.
Pantasote Co.

Checks, Employees'.
American Ry. Supply Co.

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Boyle & Co., Inc., John.

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Cutter Electrical & Mfg. Co.
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Western Electric Co.
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American Gen'l Eng'g Co.
Anderson M. Co., A. & J. M.
Elec. Engrs. Equipment Co.
Elec. Service Supplies Co.
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Klein & Sons, Mathias.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
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Cincinnati Car Co.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

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General Electric Co.

Clusters and Sockets.
General Electric Co.

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Coasting Clocks.
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Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co.

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Cleveland Armature Works.
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General Electric Co.
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Westinghouse Elec. & M. Co.

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Etter, Chas. F.

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is the verdict of a post-mortem in Middle Congo when the cause of death is unknown.

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Just as shop men will explain away some unknown motor trouble by the old reliable **"It's cranky,"** when as a matter of fact the poor machine is throwing out symptoms of improper brush application.

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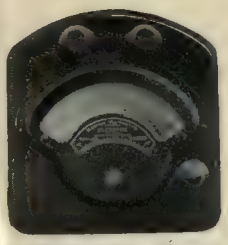
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In Very Small Indicating Instruments for Direct Current

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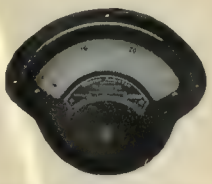
MODEL 280, Single Range Portable Voltmeter
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Miniature Precision Instruments

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Volt-Meters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters

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(One-quarter Size.)

SWITCHBOARD

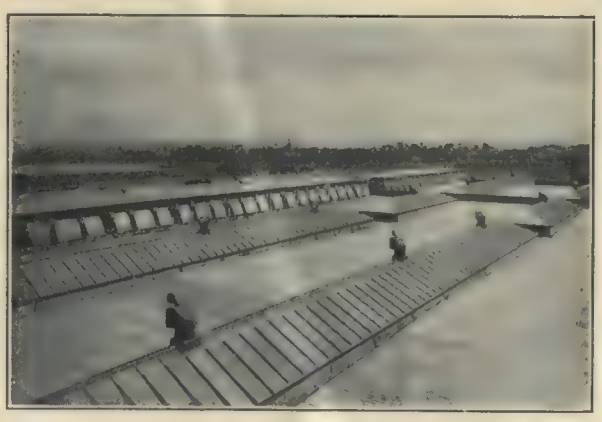
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This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.
They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate, dead beat and extremely sensitive.
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The prices are surprisingly low for instruments of such quality.
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New York	St. Louis	Detroit	Richmond	Winnipeg
Chicago	Denver	Cleveland	Toronto	Vancouver
Philadelphia	San Francisco	Buffalo	Montreal	Berlin
Boston		Atlanta		London

50,000 is the answer



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(Trade Mark)
Puttyless Skylights
Patented

About 50,000 square feet of "Anti-Pluvius" Puttyless Skylights are a feature of the Harvard Road Shops of the Cleveland City Railway. You can investigate them there or send for our catalog.

The G. Drouvé Co. Bridgeport, Connecticut

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Cameron Electrical Mfg. Co.
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Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Mica Insulator Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co. Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Westinghouse Trac. B. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.

Conduits.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Standard Underground Cable Co.
Western Electric Co.

Conduits, Flexible.
Tubular Woven Fabric Co.

Controller Regulators.
Electric Service Supplies Co.
Lord Manufacturing Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Lord Manufacturing Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
American Bridge Co.
Brown Hoisting Machy. Co.
Green Eng. Co.
Hadfield's, Ltd.
Jeffrey Mfg. Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Garton Co., W. R.
Imperial Rubber Co.
International Register Co.
Long Co., E. G.
Lord Manufacturing Co.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors & Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.
Westinghouse Trac. B. Co.

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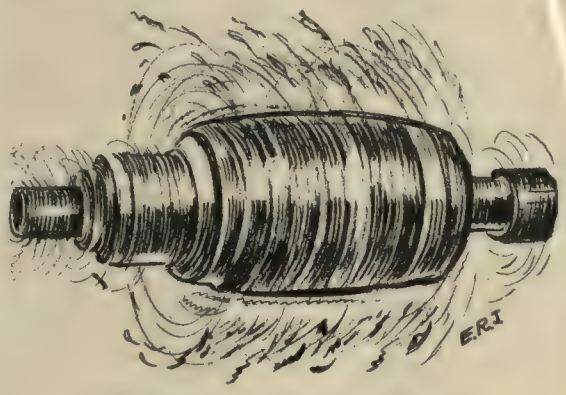
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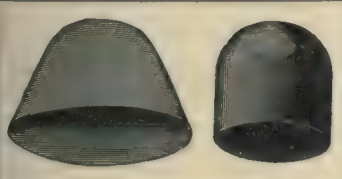
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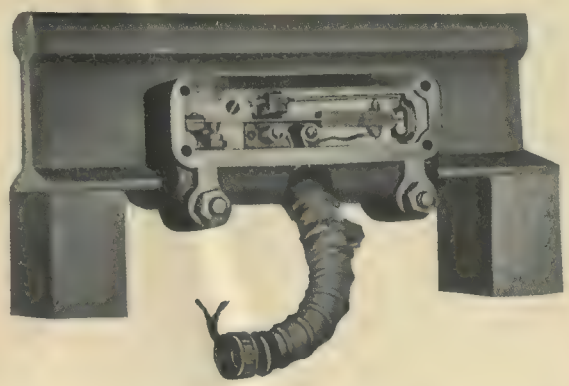
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CREOSOTED wood block pavement on a concrete foundation forms a very durable and satisfactory pavement. The creosote saturation prevents decay in the wood, but it does not prevent the expansion of the wood when wet. Laboratory experiments and service tests have indicated that, no matter how thoroughly creosoted, the wood fibre still retains some capacity for absorbing moisture.

To be sure, most of the rain will quickly run off a wood block pavement and the surface will be dry in a very short time. This, however, is because the surface of the wood block pavement gets pounded down and becomes very hard and compact, and thus is armored against the intrusion of water at that point.

There is, however, no such compacting process going on at the base of the block, and the water which finds its way down there is absorbed by the wood and a certain amount of expansion is set up. This necessitates expansion joints, which are always troublesome affairs, and which are by no means always successful.

The ideal remedy is to prevent the expansion altogether by protecting the block absolutely from water at the sides and bottom of the block. This can be done with Pitch Filler. Pitch will adhere tightly to the wood at all times of the year and at all temperatures. Sand filler, of course, has no water-resisting capacity, while asphalt filler does not cling to creosoted wood as well as pitch, which, being of kindred nature, will unite and form a homogeneous compound with such creosote oil as may exude on the surface of the block.

The favorite method of using Pitch Filler with wood block is to pour it on the surface and work it into the joints by the use of squeegees. This, for example, is the practice in Minneapolis, which has the largest area of wood block pavement of any city of the United States. It is also the common practice in London, which has 300 miles of wood block pavement.

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Printing begins on Tuesday of each week.
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New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, changes of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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ELECTRIC RAILWAY JOURNAL

Volume 45
Number 7
Feb. 13, 1915

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Electric Railway Journal

New York, February 13, 1915

Volume XLV No. 7

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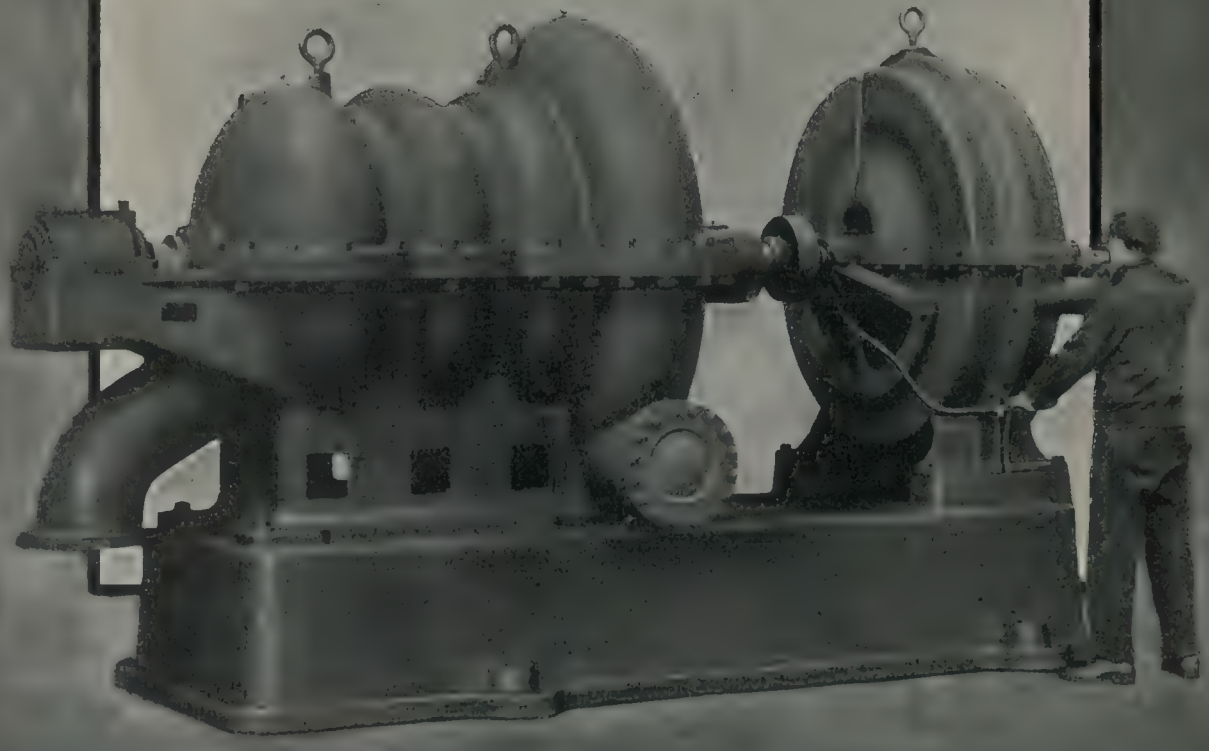
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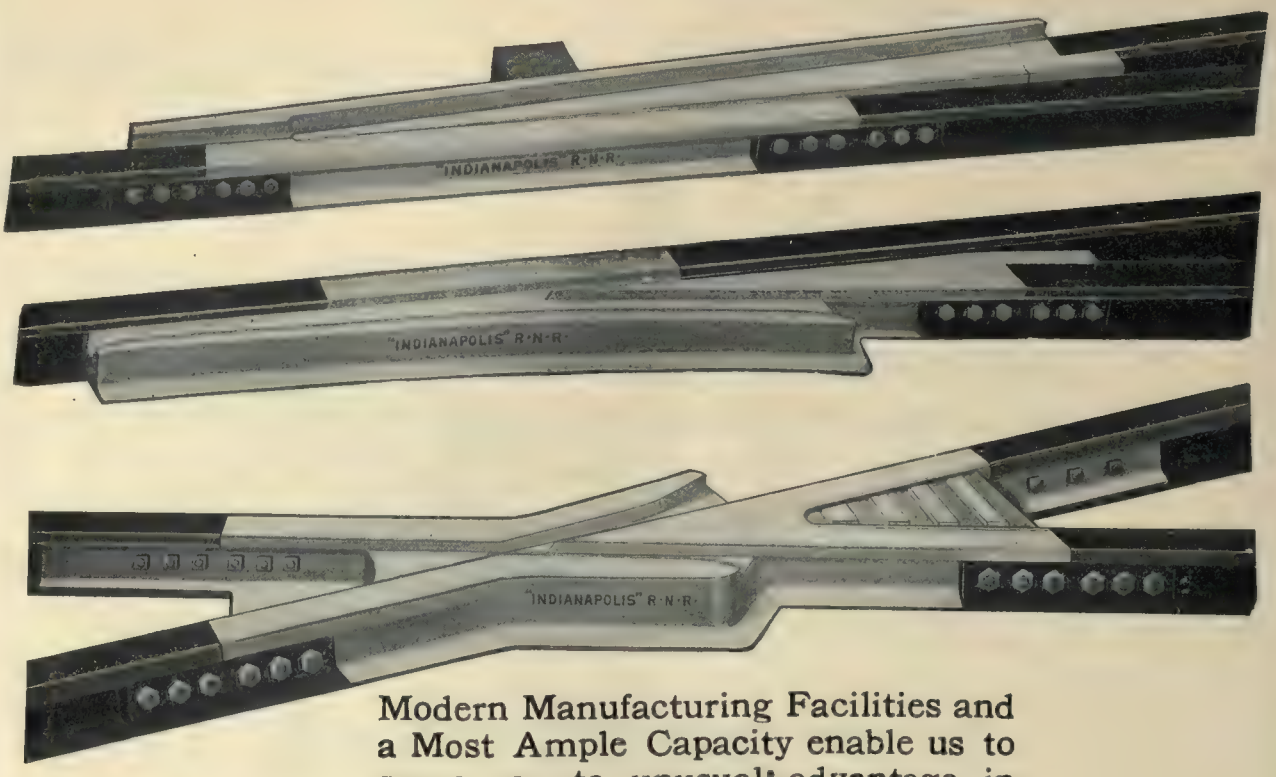
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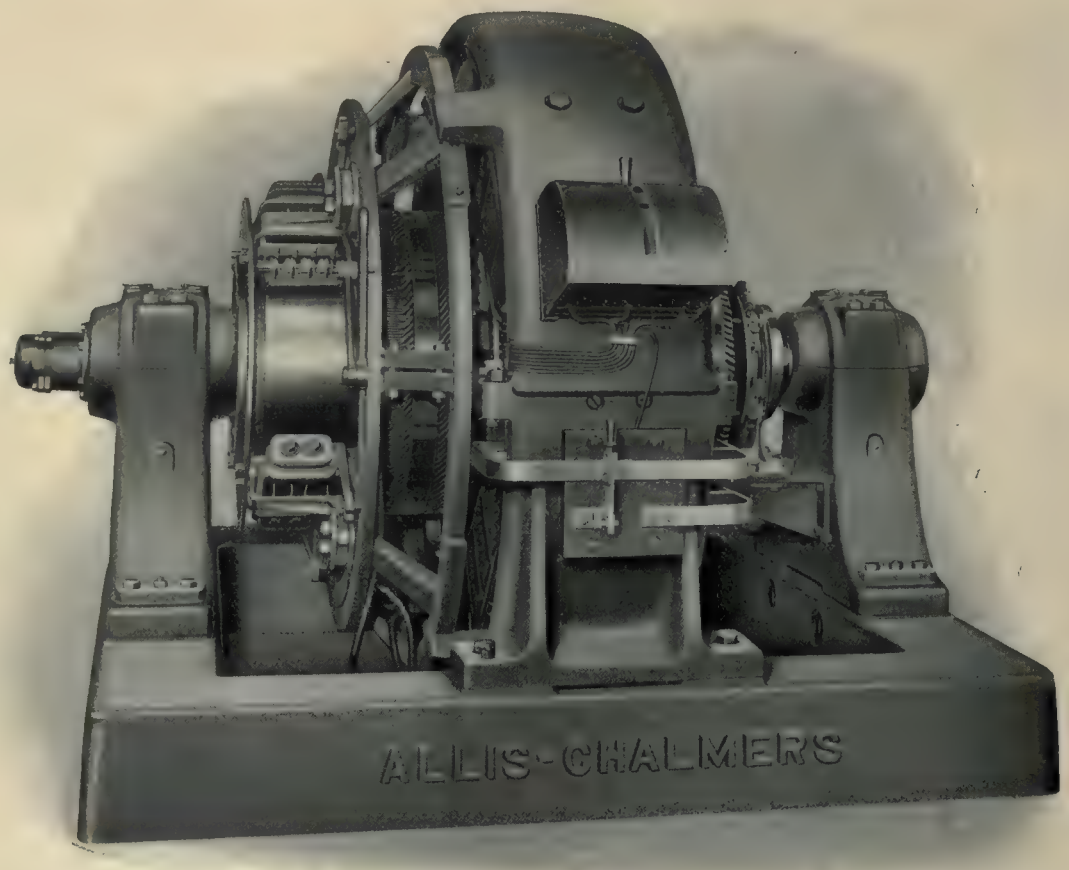
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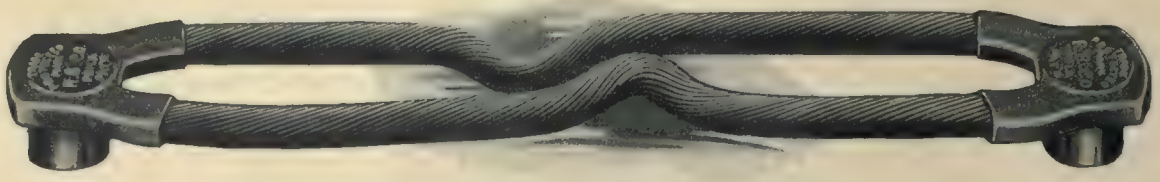
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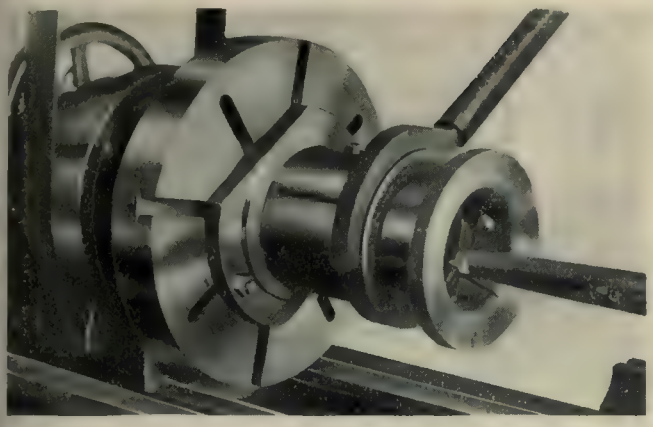
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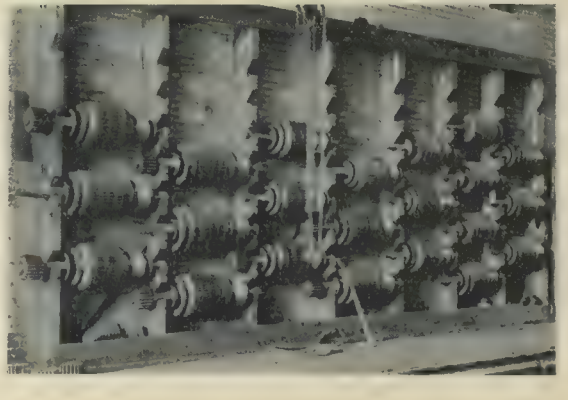
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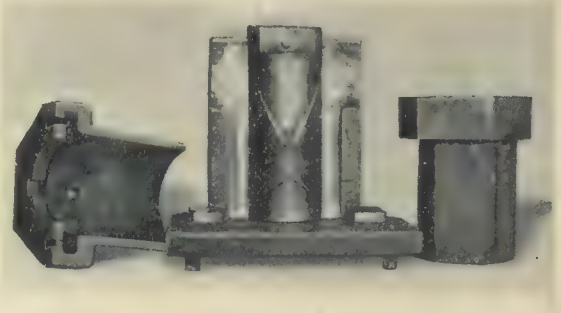
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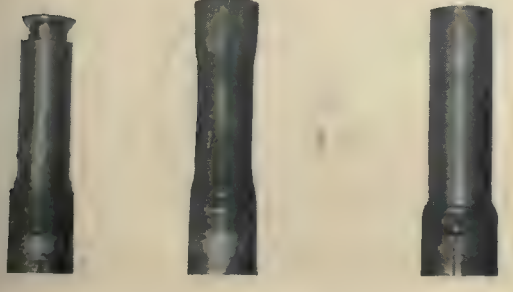




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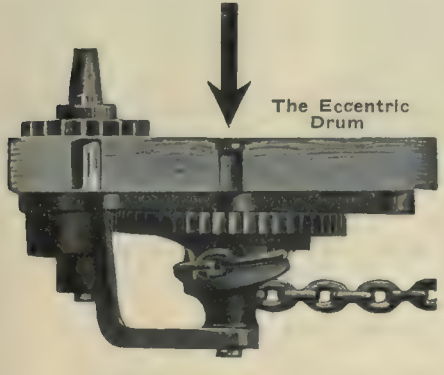
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at the handle is sufficient to take care of regular operating conditions. It may be interesting to point out here that it is customary for the Brooklyn company to operate the geared hand brake on air-brake cars in certain specified zones on each trip to be sure that it is in good working order. The geared brake will also replace the staff brake even on those cars which are not equipped with air brakes.

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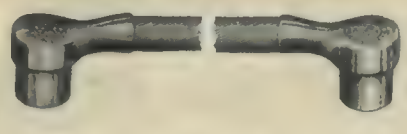
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THE PASSING OF THE SNOW MENACE

Elsewhere in this issue is described a new form of snow-sweeper that has just been successfully tried out by the New York Railways. Its principle is simple, involving merely the use of an out-board broom to clear a passageway beside the rails for the wagons and trucks which otherwise could not be forced off the tracks during snow storms. Notwithstanding the almost obvious nature of the underlying idea, its importance to the industry is much more likely to be under- than over-estimated. In fact, the surface railways have become so inured to the losses occasioned by snow storms that these have come to be accepted as a regular risk of the business, and great reductions in gross earnings for periods of two weeks or more, such as were reported in New York City last winter, are looked upon with calmness if not with equanimity. Manifestly, the major part of the loss from snow is traceable directly to reduced car movement. No one cares to pay even a nickel for a ride when walking is quicker and much more reliable, and just as long as the street-railway track offers the only pathway through a snow-covered street the speed of the cars will be measured by that of the slowest wagon upon it. Of course, it is easy to say that the municipality ought to clear the streets promptly, but on the other hand, practical experience shows that this is not going to be done. There remains only the alternative for the street railways to do the work. But if they do it themselves, the hypothesis that a snow storm in a large city means an immediate reduction in schedule speed to 3 m.p.h. need no longer be accepted.

THE EMPLOYER'S OPPORTUNITY

The educational committee of the American Electric Railway Association has announced the inauguration of the correspondence courses for employees engaged in construction, maintenance and operating work. For this purpose arrangements were made with a well-known correspondence school. Students are enrolling, and a number have already passed sections of the courses very creditably. The committee, of course, had the sanction of the association in adopting these arrangements, which were made only after the former had demonstrated to the satisfaction of all interested persons that it was impracticable to conduct correspondence courses by the association itself. While co-operation with a commercial concern is not entirely without precedent in the association, such an alliance must be guarded most carefully if the results are to be permanently satisfactory. The correspondence schools are responsible for the results of their work, but as they have authority to approach member companies with the backing of the association, the very considerable influence of the latter will cause many persons to enroll as students who would not otherwise have done so. The association must see to it that these especially, but also all others who follow the courses conscientiously, are not disappointed. To this end it is the manifest duty of every employer to take an active interest in the work of students in his employ and promptly to notify the association officers of any weaknesses or defects which are discovered in the courses. The use of special correspondence courses by large industrial concerns is on the increase, and the officers take a lively interest in the progress of their young men. In the association courses the same principle applies, but the industry is so enormous that greater effort must be made to keep track of this movement which, in its inception, will properly be inconspicuous.

STARTING RESISTANCES FOR RAILWAY MOTORS

In the issue of the Electric Railway Journal for Dec. 26 we printed and commented upon an interesting article on this subject by Mr. Castiglioni. As a result of this publication J. W. Corning of the Boston Elevated Railway sent us an account of an experience of that company which bore testimony to the importance of the subject, and this was printed last week. Since then Prof. A. M. Buck has contributed the article printed elsewhere in this issue. We are pleased to print these articles for their reference value and because they contain information not readily accessible. Calculating resistances is a mathematical rather than a controversial problem. There can be only one correct result of the application of different methods of solution. The interest seems to us, therefore, to center in the method rather than in the result. Mr. Corning puts an ammeter on the car and records the current and thus obtains data for the readjustment of resistance steps. Mr. Castiglioni, by methods necessarily laborious, works out sets of curves which when completed are applicable to all cases and for all time. Professor Buck replots the torque-current curve of the motor in terms of current and torque per ampere, and by applying to it a simple geometrical device makes it possible to calculate the starting resistances for a given equipment very quickly. For a manufacturer who has to make these calculations by wholesale Mr. Castiglioni's method appears to possess advantages as a time saver. For purposes of instruction, which naturally impelled the development of Professor Buck's plan, it is probable that his method is better in impressing fundamental principles more graphically.

ABOLITION OF SELF-INSURANCE

A pending bill in the New York Assembly contains a serious threat at one of the good features of the workman's compensation law passed at the last session. Whether it was inspired by the casualty companies or by one of those persons who actually believe that the government can do everything better than the individual or private corporation, we do not know, but its purpose is to remove the provision permitting employers, upon deposit of proper security with the compensation commission, to carry their own risks for compensation to injured workmen. The fact that all of the large electric railway companies in New York City early adopted the self-insurance plan after the law went into effect last July shows to what an extent electric railways would be affected by such a prohibition.

The alacrity with which these companies took advantage of the self-insurance provision is ample evidence of the fact that this method of insurance is considered by railways with large organizations and extensive resources better than insurance in the State fund or with casualty companies. Not only can these railways follow the mandates of the workman's compensation law most easily and cheaply in this way, but the self-insurance method more fully safeguards the interests of the employees. For years the large electric railways in the State had been paying compensation to their employees, even where no legal liability existed, as part of their systems of welfare work, and in the necessary investigation of passenger injuries and claims they had developed departments that were able with the utmost facility to handle the clerical and medical work necessitated under the new law. Thus, not only did the existing departments make it possible to adopt the self-insurance method without the piling-up of high administrative costs and overhead charges, but there was also an absence of the "loading" charges so inseparable from State fund and casualty insurance operations. In other words, each company was not compelled to make contributions to any general fund, made up by averaging good and bad risks, whereby the more stable companies have to pay the losses incurred by bad risks. Lastly, under this method, each self-insuring company was made more than ever the guardian of its own workmen, for aside from humanitarian reasons the fact that it alone had to meet all its compensation expenses gave it the most powerful incentive to minimize injuries by improving the physical conditions of its plant and providing safety appliances for operation.

The adoption of the self-insurance method, however, meant no lack of protection to the employees, for the self-insuring companies were required to prove to the compensation commission that they were financially responsible and had to file with the commission, to insure the faithful discharge of their duties, high-class securities in an amount equal to the semi-annual premium in the State fund, less 10 per cent. This latter amount had to be deposited in cash with the commission for use in the case of any immediate call for compensation payments. In the event of any death resulting in compensation payments, the self-insurers were required to deposit immediately the full amount estimated to be necessary to cover the risk involved to its full maturity.

In the light of these facts, it is difficult to see wherein lies the justice or economy of abolishing self-insurance. Insurance experts are at loggerheads on the question of whether or not the State fund is operating successfully. Governor Whitman in a special message on the subject expresses his sincere hope that the compensation commission may be so reorganized as to reduce its expenses and states that the results so far indicate that "the attempt by the State to do the business of its citizens must inevitably cause enormous expense to the Government, besides the inconvenience and disorganization of private business and injury to private interests, whether of capital or labor." He accordingly desires the work of the commission to be relieved somewhat by making the commission a supervisory party in compensation settlements between employers and employees instead of the settling party itself. If the cutting of expenses is so much needed, why abolish the very method of insurance that large electric railways have chosen for its cheapness and ease of administration? Small companies of all sorts must find strength in union through the State fund, casualty companies or mutual associations, but the expenses resulting therefrom and the cost of insurance to self-insurers need not be increased under cover of politics and the delusion that state operation is necessary for compensation insurance success.

THE RAINBOW-CHASING JITNEY

The more we learn about the cost of operation of the motor-bus in city transportation the more apparent it becomes that this "menace" is likely to take care of itself by the simple process of self-elimination. In many large cities there may be special circumstances in particular localities which will enable a bus line over a short route to exist on a 5-cent fare. But that the bus can be extensively profitable and in a large sense therefore a serious menace to the surface car, is not at all apparent. Several companies and many individuals have rushed into motor-bus operation to their sorrow. They knew nothing about cost of operation and maintenance, and there was little or nothing that could be found out about these costs had the information been sought. On paper the jitney-bus is a gold mine. At the end of a few months the cost of tires, repairs, accidents and operation of almost empty buses for five or six hours a day usually changes the golden glow to a dark blue.

Even when second-hand automobiles of the five-passenger touring-car type are used instead of the bus the same condition will obtain, whether these cars are operated by a number of individual owners or by a single company. A second-hand touring car represents, of course, a much smaller investment than an automobile bus, but its carrying capacity is proportionately less and the per cent of maintenance on its cost should certainly be no less. The rate of depreciation obviously is higher.

There is no more reason for believing that a fleet of second-hand passenger automobiles can be operated at a lower rate per passenger than the automobile bus than that the same number of second-hand carriages, when horses were used as motive power, could compete in cheapness per passenger with a regular horse-drawn bus. The jitney-bus competition which has been felt so keenly on the Pacific Coast and elsewhere in this country as described in recent issues of this paper has been largely from cars of this nondescript character, that is to say, while there have been a few buses, most of the competing vehicles have been old automobiles of practically every type, make and condition.

While there are many owners of private automobiles who can testify as to the cost of operation and maintenance of their own cars there are comparatively few reliable data on the cost of motor bus operation. The London figures, for reasons which have already been published in these pages, are not of very great assistance because the transportation conditions in that city differ so greatly from those prevailing in American cities. The latest and almost the only reliable information we have is that of the Fifth Avenue Coach Company in New York, and we present in this issue a discussion of these figures by the president of the company, supplemented by other data, including a very clear analysis of the situation in San Francisco by Charles N. Black.

The Fifth Avenue Coach Company gets a 10-cent fare and gives 10-cent service, both as to quality and quantity. Few cities can or will pay for such a service, but in the comparatively rare occasions where buses can be operated the electric railway company might well consider motor-bus operation as a supplement to its own service, if there is a genuine demand for it, rather than to leave it to others. But in support of the claim that for general city transportation the automobile can compete on at all equal terms with the electric car, not one scintilla of evidence can be adduced.

In addition to the information we now have in regard to New York and San Francisco, there may be cited the experience of Wilkes-Barre and Pittsburgh, Pa., and Washington, D. C. In the Pennsylvania cities bus operation has not been a financial success, and in Pittsburgh it has been abandoned. In Washington the bus company has a 3-mile route through the heart of the best residence district, reaching the business and shopping centers, the theaters and several government departments, yet the six-for-a-quarter fare barely earns operating expenses, and in the two years of its life the company has been unable to charge off a dollar for depreciation. It has carried a large number of passengers per bus mile run, but the expense of upkeep has absorbed the revenue as fast as it came, or faster. Any railway man who has been losing sleep over the inroads of the motor-bus, and those who are contemplating the operation of these vehicles as a short road to wealth, should study Washington's experience. The railway man will save his sleep and the other man will save his money.

There still remains the question of the best way in which the electric railways can protect their short haul business in large cities from jitney competition. So long as second-hand automobiles can be purchased at a low price there will remain the temptation for individual chauffers and perhaps garage owners to operate one or more of these cars, when these cars cannot make more money elsewhere and until they break down, in a 5-cent fare service along certain profitable routes. This is a matter where the municipality can fairly interfere, as indeed it has been done in a number of western cities. Mr. Black has shown that under parallel conditions an electric railway can transport passengers more cheaply than they can be carried in an automobile, and if the company should abandon its long unprofitable lines or charge a higher fare on them it could carry passengers on the more profitable lines for less than 5 cents.

However, the interests of the public as a whole have always been felt to lie in the American system of a uniform fare. This was what the authorities in both New York and Chicago fought for and obtained in the recent negotiations with their transportation lines. The railways of the country have been willing to haul some passengers long distances for 5 cents because they also had the short haul business, but they would be unwilling to take the unprofitable business without the part which shows a profit.

But the financial side is not the only one to consider, as Mr. Black clearly points out. There is the increased danger on the streets to pedestrians from an added number of automobiles, driven in most cases by irresponsible drivers, as well as the physical limitations of space on the streets. Then again, there is the question of taxes, street paving and other contributions to the welfare of the city in which the electric railway takes a large part. The income derived by the city from the electric railway companies from these sources is considerable, and it is only by the neglect of equivalent obligations that the jitney can thrive even temporarily. All in all, there is every reason why the city should favor the electric railway rather than the automobile pirate. Regulation can be and, in many cases, has been applied, and from any standard of equity it should be applied. There should be no difficulty in getting communities to pass such measures. But in so doing it would be well for them to realize that, if they do not reserve the right to control the routes of the jitneys, and the railways lose business on their only profitable lines, it is inevitable that all of the existing lines that now run at a loss will have to be abandoned. This may be a serious matter for many cities.

It may be that some vehicle more economical of operation than those now available will be developed. Until then the electric car can easily undersell the motor-bus and give better as well as cheaper service. The mobility (it may almost be regarded as gregariousness) of the motor-bus is an undeniable advantage, but this will usually mean merely that it can run where there is not enough traffic to support electric car lines, and it can therefore take proportionately little from the electric railway company's revenue.

A Solution for the Snow Problem

The New York Railways Company Has Tested Successfully a New Form of Snow Sweeper with An Out-Board Broom Which Clears a 12-Ft. Path Beside the Rails, Thus Eliminating Restriction of the Service During Snow Storms Through Vehicular Congestion on the Tracks

For every really large city in the United States east of the Rockies and north of the thirty-eighth parallel a heavy snow-storm constitutes a disaster that is quite comparable to a cyclone in its costliness. The spectacular features of the cyclone, of course, are lacking, but should the snow be allowed to lie where it fell the orderly course of the city's domestic economy would be rudely interrupted. The alternative is snow removal, and this involves an expense which may reach a figure, as it has in New York, of more than $2,000,000 per annum. Only an extraordinary visitation of nature in a malignant mood could inflict damage to this extent.

Ethically speaking, the responsibilities of the electric railways in such emergencies are limited to keeping their tracks sufficiently clear of snow so that cars can move, and to that end, elaborately equipped organizations have been developed for the sole purpose of fighting snow. Yet, thus far, these have generally failed in the complete accomplishment of their purpose for the very reason that, when the railway tracks are clean and the rest of the street is piled with snow, every truck and wagon gravitates naturally to the pathway thus afforded, and the electric cars are almost as effectively blocked as if the tracks had not been swept at all.

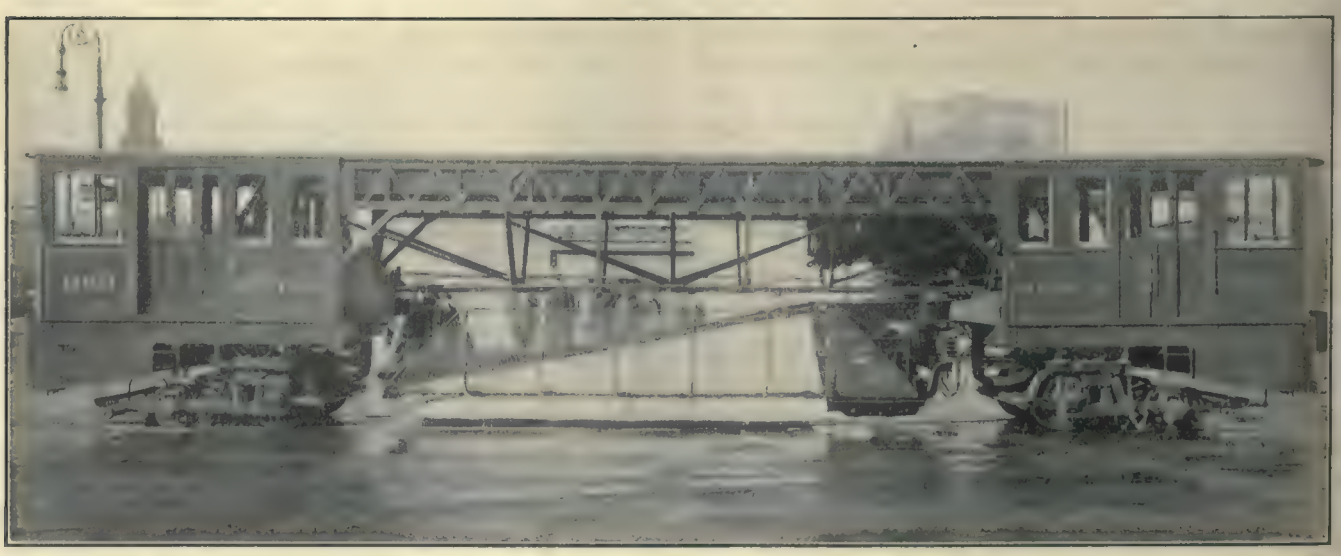
From the practical standpoint this condition is unavoidable. The economic life of the city demands continuous movement for goods as well as for persons, and an interruption of the facilities for communication means almost immediate privation and even danger to the citizens. Regardless of orders or ordinances, trucks, fire-engines and ambulances are bound to use the tracks if these provide the only passage through a snow-covevered street, and, obviously, the one method of keeping them off is the provision of a clear space outside the rails which may be occupied by the irregularly-moving vehicles.

Operating Results with New Sweepers

It is this phase of the snow problem that has been attacked, with apparently complete success, by the New York Railways. A new form of sweeper with a 16-ft. out-board rotary broom has been developed by J. S. Doyle, superintendent of equipment, and the equipment engineering department of that company, under the direction of Frank Hedley, general manager, and during last week's storm in New York City this sweeper was operated with most satisfactory results. The machine is designed to clear a path 12 ft. wide alongside of the track, and the actual experiences in its first test under the most severe conditions showed that it was fully capable of doing this work.

The results were found to be largely dependent upon the relative peripheral speed of the broom as compared with its forward movement. When the sweeper-car moved slowly, the moderately rapid rotation of 300 r.p.m. for the broom was sufficient to clear even packed snow from a paving surface composed either of wood or granite block. When the car was stationary sleet or freezing rain could be removed. This is ascribed partly to the heat of friction developed at the line of contact between the broom and the pavement and partly to the minute chipping action of each of the numerous rattan stems forming the broom filling. On asphalt, however, presumably on account of the smoothness and greater heat-absorbing ability, the broom failed to remove packed snow except when the sweeper-car was practically stationary.

It is, of course, of the utmost importance (if it really is a physical possibility to remove sleet as well as packed snow) that the sweeper should be able to clean the street surface on asphalt as well as on wood pavement because there is much of the former in use in New York and because a sleet storm is quite as effective as a fall of snow in sending trucks upon the car tracks. Consequently, the designers plan to increase the broom speed from 300 r.p.m. (as it is at present) to 800 r.p.m., with the expectation that the increased speed will permit the complete cleaning of all kinds of pavement. If necessary to enable the sweeper to maintain the normal speed of the passenger cars, and still clean sleet from the pavement, the broom will be direct-connected to its motor and run at 1300 r.p.m.



NEW YORK SNOW-SWEEPER—VIEW SHOWING BROOM SWUNG IN-BOARD INTO CLEAR POSITION AND WITH FENDER RAISED

One of the most remarkable features of the test in last week's storm of freezing rain followed by snow was the fact that when the relative speeds of broom and car were properly adjusted the pavement was left not only clear of sleet but actually dry. What this means from a humanitarian standpoint, as well as in the saving of expense and loss of time for the owners of horse-drawn vehicles, is obvious.

Another feature of the test on the new machine was the discovery that even with light snow there was a proper speed of car for every broom speed. When the sweeper-car moved faster than the speed to which it should have been limited by the broom speed, the snow was invariably left across the broom's path in a series of windrows instead of being swept completely out beyond the end of the broom.

PLAN OF OPERATION

The custom followed by the New York Railways in snow-fighting at the present time with standard sweepers is to put out all equipment as rapidly as possible whenever threatening snow begins to fall. Sweepers are sandwiched in between the regular equipment in service, at intervals averaging roughly ten cars. The sweepers are kept continuously at work on the line until the snow stops, and as the best of electrical equipments is used for the snow-fighting facilities, the company's lines have not been actually tied up on account of snow for several years past, although the speed is so much reduced by vehicular congestion that for several days after a severe storm receipts fall off very materially.

The new type of sweeper is designed for a similar scheme of operation, and consequently, as it will have to be used during hours when vehicular traffic is heavy, provision has been made whereby the out-board broom can be swung at will inside of the tracks to clear vehicles that pass or are passed by the sweeper as it moves forward. Arrangement has also been made so that the direction of movement of the sweeper car can be reversed and the broom can be extended on either side and at any angle. This has involved the use of two cabs, one at each end of the sweeper body, between which is a bridge structure which carries the broom and which permits it to be swung out-board on either side.

The broom is rotated by an independent motor mounted on the broom carriage and another motor provides power for swinging the carriage out board at the desired angle. In operation, these two motors are controlled by a man stationed in the forward cab who swings the broom in-board whenever a vehicle is passed and who also varies the broom speed and pressure to suit conditions. The motorman who runs the sweeper car is, of course, located in the front cab and his duties are confined to this work alone. A mechanic is also carried in accordance with the standard practice of the New York Railways, to care for the sweeper mechanism. At switch backs or at the stub ends of lines the broom is swung to the opposite side of the sweeper-car and the broom carriage is moved to the opposite end of the open structure between the cabs so that the in-board end of the broom is in advance of the out-board end. This operation has been made possible by mounting the supporting mechanism of the broom carriage on what is called a mast-carriage, or trolley, that runs on an overhead track supported by the open structure between cabs, a small motor being provided to move the mast-carriage as desired.

As the plan of operation involves the sandwiching of sweepers in between the passenger cars, frequent sweepings will be the rule. A snow fall, therefore, will not be permitted to pile up, and no sweeper will be called upon to handle snow that has a depth greater than say ¼ in. This scheme of eliminating the necessity



NEW YORK SNOW-SWEEPER—REAR VIEW SHOWING ARRANGEMENT OF WARNING LIGHTS AND BELL AT END OF BROOM



NEW YORK SNOW-SWEEPER—VIEW SHOWING BROOM SWUNG OUT-BOARD READY FOR OPERATION

for "plowing" snow is to some extent a new one, and, naturally, it provides against strangulation, even for short periods, of the electric car service because of teams on the tracks. The anticipated result will be to permit practically normal schedule speed for cars even during snow storms. As the speed under present snow-storm conditions is sometimes reduced to the vicinity of 3 m. p. h., and as the effectiveness of the present sweepers is reduced in proportion to their speed, it is believed that a sweeper of the new type will do about twice as much work as one of the old ones because of its higher speed. On the New York Railways the present snow-fighting equipment, which is known to be ample, consists of one sweeper for every 2 miles of single track, so that the capacity of one of the new machines under New York conditions is estimated roughly at 4 track miles. The cost of the new machines, it may be said, is roughly estimated at 50 per cent more than that of a standard double truck sweeper so that, considering the increased capacity, equipment of the new type will really cost less than the old. However, as expressed by Mr. Doyle, the cost is almost immaterial if equipment can be provided to prevent the recurrence of such conditions as existed in New York last winter, when two heavy falls of snow in close succession practically paralyzed transportation for more than a week, resulted in great privation, cut heavily into railway receipts, and even left the city open to disastrous conflagration through the inability of the fire department to respond promptly to calls.

Details of Construction

As shown in the accompanying illustrations, the new sweeper-car consists of two cabs mounted on standard trucks and connected by an open bridging. Close under the roof of this central portion are a pair of rails that carry the mast-carriage, which may be moved from one end of the bridging to the other by means of a small motor geared to the wheels. In bearings at the center of the mast-carriage a 7-in. shaft, or mast, is carried, and upon this shaft between the upper and lower bearing in the dropped-frame of the carriage is keyed a heavy worm-wheel, 48 in. in diameter. The worm that meshes with the wheel is driven by a 5-hp motor mounted on the carriage frame so that as the motor is rotated the shaft turns and the broom carriage, which is keyed solidly to the shaft and is in fact supported solely by it, is swung either to the right or to the left according to the direction of rotation of the motor.

It may be of interest to state that the force which is exerted by the broom as it drags forward on the street surface has been found by dynamometer test to be

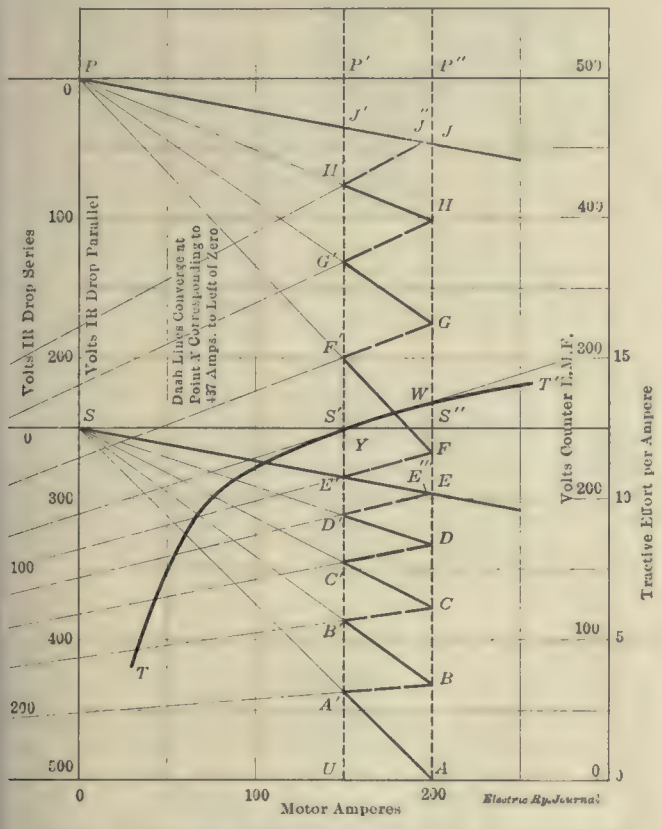


NEW YORK SNOW-SWEEPER—VIEWS SHOWING ORIGINAL ARRANGEMENT OF OPERATOR'S CABIN WITH HINGED ROOF AT END OF BROOM. THIS LOCATION FOR OPERATOR WAS GIVEN UP BECAUSE OF THE FLYING SNOW THROWN BY THE BROOM

for example, from the characteristic curves in Fig. 1) a value may be obtained proportional to the flux:

$$\frac{D}{I} = k\Phi \qquad (4)$$

Since tractive effort and torque only differ by the constant ratios of gearing and wheel diameter, the former may be used equally well in equation (4), merely changing the value of the constant k. A curve plotted between tractive effort per ampere and motor amperes, as $TYWT'$ in Fig. 2 will then represent the variation in flux with magnetizing current. This relation holds true only in the case of motors whose field current varies directly with the load current.



MOTOR STARTING RESISTANCE—FIG. 2—DIAGRAM FOR CALCULATING RESISTANCES

In finding the increase of counter-emf when the resistance is reduced so that the current increases from I'' amp to I' amp, it is only necessary to determine the values of tractive effort per ampere for the two values of current. That is,

$$\frac{E_{c_1}}{E_{c_2}} = \frac{D'/I'}{D''\ I''} \qquad (5)$$

where E_{c_1} and E_{c_2} are the counter-emfs corresponding to currents I' and I'' respectively, and D' and D'' the values of tractive effort for those currents. The value of E_{c_1} having been found already by equation (2), the value of E_{c_2} can be determined from equation (5). The new value of resistance will have to be such as to give the counter-emf E_{c_2} when a current I' flows through the circuit, which will satisfy the equation

$$I' = \frac{E - 2E_{c_2}}{R_2 + 2r} \qquad (6)$$

This equation is similar in form to equation (1), but takes account of any value of counter-emf which may exist at the moment.

Applying these equations to the example cited, we have from equation (2),

$2Ec_1 = 500 - 150\ (2.036 + 2 \times 0.232) = 125$ volts.

This is the counter-emf existing the instant before the resistance is reduced. The instant after the resistance has been reduced, this becomes

$$2E_{c_2} = 125 \times \frac{13.43}{12.40} = 135 \text{ volts.}$$

The necessary value of resistance is found from the relation

$$200 = \frac{500 - 135}{R_2 + 2 \times 0.232}$$

from which R_2 is found to be 1.361 ohms.

The same reduction in torque as the speed of the motor increases will be noted, and, when the current has fallen to 150 amp, the counter-emf may be calculated by equation (2) as before. A new value of resistance may then be found by the use of equations (5) and (6). This process will be continued until all the resistance is cut out, and the motors are connected in series directly across the line.

To obtain further acceleration it is necessary to reconnect the motors in parallel. The counter-emf per motor will be the same; but when the connections are changed to parallel the two emfs will not add. Equation (2) will have to be rewritten as follows:

$$E_{c_1} = E - 2I''\left(R + \frac{r}{2}\right) \qquad (7)$$

Having found the new value for E_{c_1}, the value of E_{c_2} may be found by equation (5). By this method all the values for the parallel resistances may be determined. The table shows these values as determined for the problem outlined. In the columns for counter-emf, the upper values are for each motor (E_c), and the lower for the two motors when they are in series. In the columns for resistance, the upper values are per motor and the lower for two motors in parallel.

It may be seen that on points 5 and 9, on which all resistance has been cut out, the current will not rise to quite 200 amp. This is unavoidable with the assumptions made.

This method of calculation lends itself very readily to a graphical solution. Referring to Fig. 2, a diagram has been plotted between motor amperes and motor volts. If the line emf is 500 volts, then when the two motors are in series, each will be taking 250 volts, less what is consumed in the resistance. The lines SE and PJ have been drawn at an angle such that the ordinate, as $S'E'$ or $P'J'$, represents the IR drop in one motor at any current I. The line SA has been drawn to represent the IR drop per motor for any value of current, when the resistance is so chosen as to bring the motor to a standstill at 200 amp. When the current has fallen to 150 amp, the total IR drop is represented by the ordinate $S'A'$, and the drop in external resistance by $E'A'$. If the resistance is then reduced so as to increase the current to 200 amp, the counter-emf will be increased by the ratio given in equation (5). The curve $TYWT'$ between tractive effort and current has been plotted to the same base, although, if the current limits are to be those decided on, the points Y and W are all that need to be located. The straight line WYX is then drawn through Y and W, intersecting the current axis prolonged at X. It will be seen at once, from similar triangles, that any line drawn through X will produce intersections on the lines UP' and AP'' that are proportional. That is,

$$\frac{UA'}{AB} = \frac{UY}{AW}$$

and so on, for any possible line drawn through X. If then the line $XA'B$ is drawn through X and A', intersecting AP'' at B, the ordinate AB will represent the counter-emf developed when the current has been in-

creased from 150 amp to 200 amp without changing the speed. The ordinate *S″B* gives the total *IR* drop, and *EB*, the drop external to the motor; this latter, divided by the current, determines the new value of resistance. The *IR* drop will then decrease along the line *BB′* as the current falls off, until, at point *B′*, the current must be increased again. The same construction is repeated until the two motors are in series without resistance. The current which will be obtained when the last point of resistance is cut out may be readily determined, since the *IR* drop in the motor alone is plotted as *SE*. When the last line radiating from *X* is drawn it will intersect this line at some point as *E″*. The abscissa determines the current.

In changing to parallel it is only necessary to move the axis of reference for *IR* drop to the proper point, in this case the ordinate for 500 volts, and continue the construction from that point. The construction is otherwise exactly the same as before.

As shown, the diagram is theoretically correct, and a comparison of the values found graphically for resistances with those calculated and tabulated as below

Points on Controller	Speed		Counter emf		*I R* Drop		Resistance		
	200 amp	150 amp	200 amp	150 amp	200 amp	150 amp	Total	Motor	External
1	0.0	2.35	0.0	62.5 125.0	500.0	375.0	2.5	0.464	2.036
2	2.35	4.26	67.5 135.0	113.0 226.0	365.0	274.0	1.825	0.464	1.361
3	4.26	5.82	122.2 244.4	154.5 309.0	255.6	191.0	1.278	0.464	0.814
4	5.82	7.06	167.0 334.0	188.5 377.0	166.0	123.0	0.830	0.464	0.366
5	7.06*	8.09	203.6* 407.2*	215.2 430.4	92.8	69.6	0.464	0.464	0.0
6	8.09	11.24	232.0	299.0	268.0	201.0	1.340 0.670	0.232 0.116	1.108 0.554
7	11.24	13.8	322.5	366.7	177.5	133.3	0.887 0.443	0.232 0.116	0.655 0.327
8	13.8	15.8	395.0	421.0	105.0	79.0	0.525 0.262	0.232 0.116	0.293 0.146
9	15.8*		453.6*		46.4		0.232	0.232	0.0

*At 196 amperes.

shows how closely they agree. Further, the diagram may be used for any value of line potential without any further change than shifting the origin for the *IR* drop. For different current limits it is necessary to take new points on the tractive effort per ampere curve, thus getting a new location for *X*. The shape of the curve, as drawn on the diagram, shows that a small variation may be made without relocating this point, and the error will not be great.

In general, as the resistors must be used both for the series and the parallel connections, a certain amount of adjustment must be made of the values found for definite current limits. The method of doing this is to continue the *IR* drop line corresponding to the actual resistance until it intersects the corresponding dash line. The current values will then, of course, not be those selected at the outset as the limiting ones.

The great advantage in the use of this diagram for determining motor resistances lies in its extreme simplicity. All that is needed is the tractive effort curve of the motor, and the motor resistance. The accuracy depends on the care with which the diagram is drawn, and makes no use of assumed constants, so that it can be used with any type of series motor.

According to *Railway and Locomotive Engineering* painful accidents have sometimes been caused by molten lead exploding while being poured, and many workmen have had their patience sorely tried when pouring melted lead around a wet joint to find the lead explode, blow out or scatter from the effect of the steam generated by the heat of the metal. The whole trouble may be stopped by putting a piece of rosin about the size of a hickory nut into the ladle before pouring.

Northern Ohio Traction & Light Company "Safety First" Work

During the past year the number of accidents of all kinds on this property was 34 per cent smaller than that for 1913, and there were 45 per cent fewer fatalities from all causes. The number of persons injured in getting on or off cars was reduced by 35 per cent and the number of collisions with vehicles by 43 per cent. This company operated during the past year a total track mileage of 233.2; the number of car-miles run was 8,810,466.

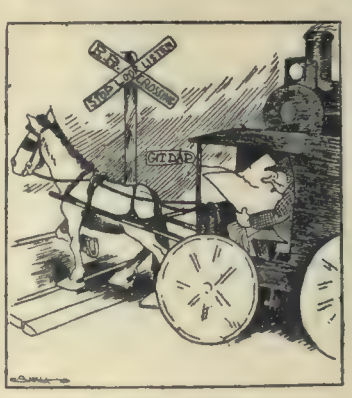


ILLUSTRATION FROM THE COMPANY'S BULLETIN

The safety work of the company is carefully organized in the department of the general claim agent, who has also the title of supervisor of safety. He is assisted by a large safety committee carefully chosen by the men. One of the effective features of the work is *The Traction Bulletin*, published twice a month for distribution on the cars. The *Bulletin* contains information regarding the operation of the company, time-tables and useful general information, not omitting a few jokes. An illustration used in a recent issue is the one taken from *The Philadelphia Times*, shown herewith. It was reproduced with editorial comment. E. H. Clinedinst is supervisor of safety of the company.

Sources of Creosote Used in the United States

The increasing demand for coal-tar creosote in the United States and the apprehension regarding the supply because of the European war, makes the question of our sources of supply a pertinent one. In a recent issue of the *Wood Preservers' Bulletin* it is stated that the consumption of coal-tar creosote in the United States during 1913 amounted to 109,373,359 gal., which was the largest on record. Of this amount less than 40 per cent was produced in this country, while that imported totaled more than 69,800,000 gal., or 64.4 per cent of the total consumption. Practically all of the coal-tar creosote imported came from countries now at war, although as stated in the proceedings of the American Wood Preservers Association's last annual convention, shipments are still being made from all these countries except Germany. According to the information furnished by the United States Department of Foreign Commerce, the sources of supply and their growth in 1912 and 1913 were as follows:

IMPORTS OF CREOSOTE

Imported from	1912 Gallons	1912	1913 Gallons	1913
Europe:				
Belgium	396,652	$19,103	7,675,174	$326,925
France				
Germany	15,602,683	611,454	17,947,501	704,802
Netherlands	3,638,793	161,700	7,062,248	412,003
Sweden	9,588	1,124	3,600	618
United Kingdom—				
England	21,380,832	1,064,143	22,383,966	1,268,988
Scotland	9,596,183	428,298	13,581,965	930,954
Ireland	635	40		
Total Europe	50,625,366	$2,285,862	68,654,454	$3,644,290
North America	1,672,836	95,724	1,151,224	67,050
Total imports	52,298,202	$2,381,586	69,805,678	$3,711,340

Higher Fares Restored in Milwaukee

Commission Rescinds Low Fare Order—Says Interest of Greatest Number Best Promoted by Rates High Enough to Cover Cost of Reasonably Adequate Service

An order has been issued by the Railroad Commission of Wisconsin rescinding the decision of Aug. 23, 1912, which required the Milwaukee Electric Railway & Light Company to discontinue the ticket rate of twenty-five tickets for $1 and substitute therefor a ticket rate of thirteen for 50 cents. The decision of the commission, dated Jan. 30, 1913, is signed by John H. Roemer, who has just retired as chairman, and Halford Erickson. David Harlowe, the third member of the commission, who has also retired, did not sign the decision.

The order was issued after a hearing on a petition of Christ Woehsner, Mayor of Cudahy, Wis. He expressed his belief that the order of Aug. 23, 1912, was unreasonable and unjust in preventing the Milwaukee Electric Railway & Light Company from getting a fair return. He asked that the order be so modified that the earnings of the suburban railway system owned by the Milwaukee Light, Heat & Traction Company and the earnings of the city system of The Milwaukee Electric Railway & Light Company should be combined and considered as a whole.

Counsel for the city of Milwaukee objected that the complaint should be dismissed on the ground that under the railroad commission law an individual does not have the right to complain as to the amount of earnings made by a corporation under an order of a commission; that the proper method to test orders is through the right of appeal provided in the statutes. Counsel for the city also felt that the Milwaukee Light, Heat & Traction Company had no franchise to do business within the city limits of Milwaukee.

The Milwaukee Electric Railway & Light Company declared that by the modifying order issued Oct. 28, 1914, the commission unjustly and improperly extended fare limits and reduced rates of fare of the company and the Milwaukee Light, Heat & Traction Company. On Dec. 5, 1914, the Milwaukee Light, Heat & Traction Company instituted an action in the Circuit Court of Dane County against the Railroad Commission alleging that the order of Oct. 28, 1914, did not provide a fair and equitable return upon the property. The company also declared that the ordinance of Jan. 2, 1900, and other franchises constitute contracts. The company alleged that the return on the street railway system for many years has been and is now less than 5 per cent per annum, whether based on the proper investment therein or on the fair value of the property used and useful in the conduct of the railway, and that the rate of return which would be earned under the rates of fare existing prior to the order of Aug. 23, 1912, has been at all times and would be less than 6 per cent per annum, whether based on the investment in the street railway property or on the fair value thereof, and that the order of Aug. 23, 1912, requires reductions in the fares which will diminish the revenues and return more than $170,000 per year.

The Milwaukee Light, Heat & Traction Company in an answer to the petition alleged that the return which it is now earning and has earned for many years on its railway system is less than 5 per cent per annum, whether based upon the proper investment or the fair value of the property used and useful for railway purposes.

Physical Property Changes Large

In taking up the changes which have occurred since Dec. 31, 1911, and their effect upon the future, the decision first considers physical property. By far the most significant of the factors which have contributed to the changed conditions existing at present have been the additions to physical property. During the four years ending Jan. 1, 1915, the additions aggregated $4,691,843, resulting in a total cost new of $15,206,044 or an increase of 44.6 per cent over the property on Jan. 1, 1911. In round numbers the physical property used for railway purposes by the company in Milwaukee increased from approximately $10,000,000 in 1910 to $15,000,000 at the beginning of 1915, or 50 per cent. In 1910 the revenues amounted to $3,787,323, producing an investment ratio of 38.1 per cent. For 1911 the revenues of $3,969,072 resulted in the slightly lower ratio of 37.7 per cent, while for 1914, with property at $15,000,000 and revenues of $4,110,717, the ratio is 27.35 per cent, or a decrease of more than 10 per cent.

"In other words," adds the commission, "in 1911 there existed $2.65 of property for every $1 of revenue, which increased to $3.66 of property for every $1 of revenue in 1914. To place the year 1914 upon the same profitable basis as that of 1911 it is significant to show that the revenues should have totaled $5,665,186, or a necessary increase in 1914 over 1911, assuming the same operating ratio, of $1,702,114, or 43 per cent. This last figure, compared with the actual increase in revenues of 1914 over 1911, $147,645, or 3.7 per cent, brings out the differences in conditions admirably. It may be contended that this comparison would be effected by the depressed business conditions during the latter half of 1914, but the maximum revenues collected by the company during its entire history occurred in 1913 and were only greater by $110,592 than those of 1914."

In analyzing the expenditures for additions the commission called attention to paving as an important item contributing to the decrease in net earnings. The expenditure for four years was $593,871, or 14.5 per cent of the total other additions to property.

Maintenance Costs Higher

Maintenance at present requires higher relative charges than those prevailing during the period covered by the 3-cent fare case. This is due to several reasons. There was an element of deferred maintenance in 1908 to 1911, inclusive. The new physical property installed since 1911 has caused additional maintenance to cover new property and has caused the maintenance per unit to increase and, finally, the nation-wide increases in prices of materials and wages have affected the urban transportation business very materially.

In the service case the commission concluded that at least 1.8 cents per car-mile would be required to keep equipment in proper repair. The company contended for and still contends for 2.006 cents per car-mile as an adequate allowance for maintenance of equipment. The final necessary cost, the commission declares, is certain to be from 0.5 cent to 0.7 cent per car-mile higher than the average prevailing during 1908 to 1911. The final average of 1.8 cents per car-mile or higher indicates the amount of additional maintenance which will be required to cover pay-as-you-enter mechanism, air brakes, sign and signal systems, etc., added to the old equipment.

If no appreciable increases have appeared in maintenance due to other new property there is no doubt that these will occur within several years when the newness of the additions has worn off.

OPERATION

Certain increases in wages of labor, expense of supervision and general overhead charges have been due to larger power plant and repair-shop capacity, additional crosstown lines, single-fare extensions, additional car-house accommodations and other developments. Trainmen's wages per car-hour in 1911 cost 49 cents, in 1912 49.8 cents, in 1913 51.5 cents and in 1914 53.8 cents. During 1914 an increase of $83,400 took place over 1911, of which about $24,000 was traceable to the spread of duty and minimum wage policy, $2,700 to fare-box collectors placed at important intersections where heavy loading occurs during the rush hour periods, and $58,000 to wage increases.

REVENUES

In 1909 operating revenues increased 7.6 per cent over the preceding year, in 1910 9.2 per cent, in 1911 4.7 per cent, in 1912 4.3 per cent and in 1913 2.2 per cent, while in 1914 there was a decrease of 2.6 per cent.

In 1908 operating expenses, taxes and depreciation were approximately 65 per cent of revenues. In 1913 the percentage was 75, and in 1914, 78.

Rides per capita increased from about 100 in 1897 to 250 in 1913. Recent indications point to the tendency that the present growth in rides per capita is not keeping pace with the former growth nor with the population curve. Revenues per capita increased from $5.39 in 1897 to $10.43 in 1913. The situation seems to be that the riding habit is approaching a more complete saturation than ever before in the history of the company of eighteen years.

Another factor is the decreasing average revenue per revenue passenger. The proportion of passengers paying cash fares has decreased to 15.68 per cent in 1914. The cash-fare passengers were 84 per cent of the total revenue passengers in 1900. The average fare has reached as low as 4.163 cents for 1914, whereas prior to 1900 it was approximately 5 cents.

Another important cause is the extended use of transfers. The per cent of revenue passengers using transfers increased from 25.52 in 1897 to 36.94 in 1913 and 39.66 per cent in 1914. Revenue passengers decreased from 100,073,659 in 1913 to 97,874,919 in 1914, or a difference of 2,198,740, while transfer passengers increased from 37,402,570 in 1913 to 39,263,919 in 1914, or a difference of 1,861,349. The most important causes were the installation of crosstown lines and extended transfer privileges. A conservative estimate of the annual loss occasioned by the use of these privileges is $80,000 for 1914 alone.

Among other causes which are affecting revenues adversely are automobiles, cycle cars and motorcycles.

Another more tangible cause is the order of the commission. The probable full effect of the issue of the tickets under the reduction order would be to reduce the revenues for 1912 by an additional amount of $116,000, and those for 1913 and 1914 by additional amounts of respectively $58,000 and $63,000.

Finally the general trend of industrial and financial conditions has increased materially the prices of material, labor and capital and altered economic conditions considerably in many ways. During the past eighteen years prices on commodities generally appear to have increased not far from 50 per cent. while labor in practically all lines also commands much higher prices.

The commission reached the conclusion that no encouragement can be found that for a considerable time to come the revenues can recoup their own losses, due to both permanent and temporary causes, and also make up the relative differences which now exist in the investment and operating ratios due to the large additions to physical property with the attendant outlays, to the increased costs in maintenance charges and operation and to the constantly increasing demands upon revenues on account of public requirement.

INCOME ACCOUNT

No allowances were made for working capital or going value, as it was not deemed essential for the general conclusions reached in this decision to determine a final value.

SUMMARY OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY—INCOME ACCOUNTS, 1912-14

	1912	1913*	1914
Cash investment	$16,563,559	$17,508,284	$19,246,548
Per cent return	6.377	5.906	3.634
Commission's earning value	$12,502,836	$13,862,874	$15,441,000
Per cent return	8.448	7.460	4.530
Tax commission's value	$18,191,000	$18,700,000	$20,235,104
Per cent return	5.806	5.530	3.457

NOTE—Values under 1912 and 1913, as of Jan. 1. Values under 1914 as of June 30.

SUMMARY OF THE MILWAUKEE LIGHT, HEAT & TRACTION COMPANY—INCOME ACCOUNTS, 1912-14

	1912	1913*	1914*
Cash investment	$7,781,305	$7,890,635	$8,124,627
Per cent return	2.800	2.907	3.739
Commission's earning value	$6,184,929	$6,195,208	$6,274,889
Per cent return	3.523	3.702	4.841
Tax commission's value	$5,780,000	$6,900,000	$7,084,000
Per cent return	3.769	3.324	4.289

*Year ending June 30.
NOTE—Values as of Jan. 1.

Percentage returns upon the cost of reproduction for the city company as of Jan. 1, 1912, 1913 and 1914, respectively, were 9.87, 7.29 and 5.45. For the traction company the returns for these years were 2.16, 3.77, 2.28. Taking the two companies combined the percentage returns were 7.29, 6.14 and 4.47. The income account of the city company, which was used as the basis for these calculations, does not reflect the actual condition of the finances. The amount of revenue deducted on the basis of the coupon redemption reserve fund has not equalled the probable reduction in revenues when the thirteen-for-50-cents tickets should be sold as ordered originally. To place the income account for the three years subject to the estimated effect would require a reduction of $116,000 in 1912, $58,000 in 1913 and $63,000 in 1914, resulting in a per cent return on the cost new for the years named of 8.92, 6.86 and 4.79. It has been estimated that an additional amount for the improvement of service will no doubt aggregate approximately $100,000. When this allowance is incorporated in the income account together with an allowance for reduction in revenues on the basis of the full effect of thirteen-for-50-cents tickets, the per cent returns are reduced to 8.10 for the year 1912, 6.12 for 1913 and 3.7 for 1914. Another burden upon the city company is the deficits in suburban territory. It falls upon the city system income account to produce sufficient net earnings to provide something like fair returns upon the suburban plant values. When these plant values are included in the income account of the city company together with the allowance for the additional reduction to the thirteen-for-50-cents tickets and for service requirements the per cent returns foot up to 7.38 in 1912, 5.61 in 1913 and 3.48 in 1914. "Any adjustments that can possibly be made," the commission adds, "will not prevent the conclusion that during the last two calendar years the revenues have not been sufficient to cover all legitimate demands for the adequate transportation of passengers in the city of Milwaukee and the adjacent suburban territory."

Income accounts in the accompanying table, although not accepted by the commission in their entirety, "contain certain merits which warrant a summary representation in this decision."

CONCLUSION

"The increases in the operating expenses and fixed charges of the companies and the failure of their gross and net revenues to maintain their ordinary annual growth during the past few years are due to causes that are wholly beyond the control of the companies," the commission says in conclusion. "The net earnings of the respondent now are and for some time have been considerably lower on the investment than the rates or costs at which it is well known new capital for similar undertakings can in the long run be had. The conditions in this respect are also considerably aggravated by the fact that in this case, as in nearly all large and growing cities, there is a constantly growing demand for improvements in and extensions to the local street railway service.

"The tendencies and changes in the expenses and earnings in question were seen when the order complained of was made, but it was not then thought that they were permanent but rather temporary in their nature. Had the nature of these changes then been better understood it is very certain that the order would not have been made. Justice and the law demand that the rates charged by public utilities for the services they render shall be reasonable to the utilities as well as to their patrons. The best interest of the greatest number in matters of this kind can as a rule be best promoted by allowing rates that are high enough to cover the cost of reasonably adequate service. As the rates provided by the order complained of fall short of this, we are in fairness to the petitioner and in the interest of patrons compelled to find that this order is unreasonable and that it should be repealed or abrogated."

COMMENT OF MR. MORTIMER ON THE DECISION

Commenting on the decision of the Railroad Commission of Wisconsin, James D. Mortimer, president of the Milwaukee Electric Railway & Light Company, said to the ELECTRIC RAILWAY JOURNAL:

"The order of the commission restoring the franchise rates of fare prevailing prior to the previous order of Aug. 23, 1912, was determined upon after a most thorough examination of the facts and the finances of the railway department of the Milwaukee Electric Railway & Light Company. The original order of 1912 was predicated upon a relation between earnings and value of property which was the maximum ever attained in the history of the company. During 1911 and 1912, the company was engaged in a large amount of construction work which added very materially to its property account. The original decision contained no adequate recognition of this large additional investment then in process of completion or the further investment that would be required during the remainder of 1912 and during the year 1913. This additional investment, together with expenses arising out of higher wages, greater expense on account of injuries and damages, and additional burdens imposed by virtue of the police powers of the municipality, such as sprinkling streets, replacing pavement not apparently contemplated under the franchise, and raising and lowering tracks to conform to new grades, all contributed to bring about the low ratio between net earnings and value of physical property, upon which the commission based its recent rescinding order.

"The commission has indicated its breadth of view and strength of character in frankly admitting that the order of 1912 was in error and was issued without sufficiently complete recognition of the then current tendencies of the costs of street railway operation.

"The facts would have justified a rate of fare higher than 6 tickets for 25 cents and 25 tickets for $1, but in view of these long established commutation rates, any departure therefrom would probably not be in line with sound public policy. Even with rates of fare lower than the standard nickel, the same aggregate return may be attained by shortening the length of haul for a single fare. There are opportunities for this treatment on a number of our suburban lines."

COMMUNICATIONS

Mr. Murray's Franklin Institute Paper

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA., Feb. 5, 1915.

To the Editors:

In your issue of Jan. 30 you give an abstract of a paper by W. S. Murray, which was presented at Philadelphia on Jan. 20. This last paper on the New Haven electrification, giving as it does costs of operation, is of the greatest interest, as, in fact, are all of Mr. Murray's papers. The costs given speak for themselves and need no comment. It may not be amiss, however, to discuss some of the statements in the remainder of the paper. The pause in the onward march of the electrification of steam railways, due to financial depression, is not an unmixed evil. It is of great value not only to the railways themselves but to the manufacturing companies. It offers an opportunity for a study of ways and means, of necessity and cost, of advantages and disadvantages of electrification, and for planning the work which it is recognized must come sooner or later, so that it can be done in the most economical manner and at the same time secure the maximum of advantage. The writer is very much opposed to legislation designed to force the electrification of steam railways. Electrification under such conditions will inevitably cost a great deal more than necessary and the city securing electrification by such means will lose a great part of the advantage which it should have. The work would have to be done under pressure, and plans which really require years of study would have to be rushed through in a few months. The examples of electrification which are now in progress are in places where an actual financial saving will result from them, and this is what every thorough electrical engineer expects will ultimately be the case on a great many of the roads in this country. The problem is so vast, however, that it must not be forced or there will be a heavy loss instead of a financial gain.

Another subject which is touched upon in Mr. Murray's paper is the administration in electrical operation. Manufacturers of electric locomotives are familiar with the expression "That is railroading," which has come to mean that the operating men expect a locomotive to stand any amount of abuse that can be heaped upon it no matter whether it is injured or not; that it will be expected to haul continuously any load that it can start. This method of operation is usually sufficient to eliminate entirely any possibility of financial profit from the investment in electrification, and reduces the matter simply to a question of how much more it is going to cost the company to operate electrically than by steam. Fortunately, as Mr. Murray says, this attitude has changed to a great extent on railroads where the operating men are coming to understand that electrical apparatus has limitations and that it costs vastly more to maintain it if it is abused than if it is treated as any valuable piece of machinery should be treated—namely, with some degree of intelligence and respect. There is nothing in Mr. Murray's paper that is any truer than this statement: "Successful electrification, therefore, requires that there be in the admin-

istrative forces men trained to the necessity of a different viewpoint from that which has been developed in eighty years of steam service."

The writer would, however, take issue with Mr. Murray as to the disadvantage of the employment of steam locomotive engineers for operating electric locomotives. He believes that such men, if properly educated as to the capabilities and limitations of these locomotives, will operate them as well as new men specially trained. They must, however, be given a proper point of view by men who are thoroughly familiar with electric locomotives and have authority to enforce their instructions.

One thing that would be of the greatest advantage on a railroad is a more thorough co-operation between the motive power department and the transportation department than is usually found on trunk-line railways. Both departments should have a voice in the selection of apparatus for the operation of the railway. The transportation department should state the service requirements before the capacity, speeds, etc., of locomotives are decided upon. The equipment should be purchased upon this basis if it is approved by the management of the railway, and, after it has been installed, the transportation department should be required to adhere as closely as possible to these specifications and not be permitted to take the equipment and see how much more can be done with it. Such methods always result in financial loss to the company and dissatisfaction with the apparatus if it has been designed with the ordinary factor of safety.

N. W. STORER.

Calculation of Starting Resistances for Railway Motors

NEW YORK, Feb. 2, 1915.

To the Editors:

In recent issues of the ELECTRIC RAILWAY JOURNAL several communications have appeared commenting upon the method which I proposed in the issue of Dec. 26, 1914, for calculating starting resistance. Allow me to take up some of the points raised by Professor Harding, Mr. Cameron and Mr. Simmon.

If Professor Harding recognizes that the proposed method and the calculation in itself are of interest to the manufacturer who is studying a new proposition based on certain data, it is difficult to see why, in case the data have to be changed or the existence of some trouble suggests the desirability of investigating the matter, the same procedure shall not be useful to anyone else who wishes, with little time and effort, to determine the correct arrangement of the grids.

Referring to Mr. Cameron's communication, I am of the opinion that problems regarding traction can be studied better on paper than by tests because, if the variables entering the problem are numerous we can, on paper at least, make use of reasonable averages and have some basis for comparisons, while in actual operation there are many causes of difference in addition to the variables under study. Hence it is difficult to obtain two runs with all conditions but the one in question absolutely identical. This is especially true in the problem of starting a train where the sudden "jerks" of the current corresponding to the controller operation are not easily and precisely followed by means of an ordinary ammeter, and are given in an uncertain manner and on a small scale by recording instruments. To the uncertainty of these tests are added others due to the manner of operating the controller which, with very slight variations, can produce remarkable differences in the current peaks, as the motors are operated at starting on the flat part of the torque-current curve.

Primarily the difference in ideas as to the best method of determining the proper resistance is this: By the theoretical method, as described in my plan, the work can be done on paper, accurately and in an hour's time at a cost of, say, 50 cents. By the practical method a car has to be prepared for test, the results must be plotted, the resistors must be readjusted and the car again tested, etc. This process must be continued without the operator in the end being sure that any final good results are due to a better arrangement of steps or rather than to changes in some of the variables not under the control.

In making calculations by my method it is not necessary to make arbitrary assumptions, such as that there is no line drop, that resistance grids run cold in city service or red hot in interurban service. To take care of such matters only good engineering judgment is required in assuming reasonable average data, and then the theoretical study will yield satisfactory average results.

Mr. Simmons hints at some of the difficulties of the starting resistance problem, such as the necessity for correcting the resistance on the first step. I need simply note that as the method which I outlined is based on simple and rapid calculations it permits allowance to be made for such matters without great effort.

In conclusion, it should be understood that the proposed solution does not pretend to eliminate the "cut and try" inherent to the problem, but only to hint how to "cut" and to make the "trying" less discouraging. These two operations might be irksome to the man who has not the experience of the specialist and the free use of the accumulated data of a manufacturing company.

F. CASTIGLIONI.

Efforts will be made to bring about repeal of the full crew laws in Pennsylvania and New Jersey at the present sessions of the Legislatures in these States. Thirteen railroads operating in the two States have joined to make a public appeal to the people for their support in accomplishing this object. These railroads have organized a committee to take charge of the work. R. L. O'Donnel, general superintendent of the Pennsylvania Railroad, is chairman of the committee. The other members are: C. H. Ewing, general superintendent of the Philadelphia & Reading Railway; F. Hartenstein, assistant to general manager of the Lehigh Valley Railroad; Robert Finney, general agent of the Baltimore & Ohio Railroad; J. S. Fisher, solicitor of the New York Central & Hudson River Railroad. This executive committee represents the committee which in turn represents the Pennsylvania Railroad, Baltimore & Ohio Railroad, Philadelphia & Reading Railway, Lehigh Valley Railroad, Erie Railroad, Lackawanna Railroad, New York Central Railroad, Delaware & Hudson Railroad, Buffalo, Rochester & Pittsburgh Railway, Pittsburgh, Summerville & Clarion and Cumberland Valley Railroad.

The Public Service Commission of Missouri has issued its first volume of reports for the period from April 16, 1913, to Sept. 24, 1914. Besides the complete reports of all cases decided during this period, the volume contains a table of the cases reported, a table of the cases cited, an index of cases by localities and also an index-digest of findings for all the cases with cross references.

Arrangements have been completed for handling mail at Junction City, Kan., over the Interurban Railway from Manhattan, and contracts have been sent to the Post-Office Department at Washington for approval. It is planned to serve Fort Riley and Ogden in the same manner if the Junction City contracts are approved in Washington.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Association Activity Invades Phillipine Islands—Public Service Section Announces Comprehensive Program—Company Section Committee Expending Literary Effort to Enlist Interest

MANILA ELECTRIC RAILROAD & LIGHT COMPANY SECTION

The organization meeting of joint company section No. 5 of the American Electric Railway Association and the National Electric Light Association was held in Manila, P. I., on Dec. 15. The following officers were elected: President, Oscar Keesee, superintendent of transportation; vice-president, Arthur J. Grant, superintendent of lighting installation; secretary, Walter E. Smith, purchasing agent; treasurer, E. A. Barretto, cashier; directors (1 year) H. P. L. Jollye, assistant auditor; (2 years) B. Solano, chief clerk accounting department; (3 years) Roman Lopez, superintendent of electrical distribution. J. B. Russell, auditor, was designated by the company as the director ex-officio.

J. B. Russell addressed the meeting on the aims and objects of a company section, the character and scope of its work, its advantages and benefits, and on the necessity of each individual member doing his share in furthering the interest of the section. He dwelt with special emphasis upon the advantage of a company section in Manila because of its geographical location, far removed from the headquarters of the parent associations. As this isolation makes it difficult for employees of the company to attend the annual conventions of the associations, they can profit to an unusual extent from the local association.

C. N. Duffy, vice-president and general manager, called particular attention to the gold medals awarded annually by the Railway Association and the Electric Light Association respectively for the best papers read before company sections, and urged the members to be competitors for these medals. As an extra inducement Mr. Duffy announced that he would personally give the sum of $100 to the winner of either medal and that he hoped that the Manila company section would win both medals in 1915.

Before the election of officers the constitution of the joint company section was acted upon section by section. This has since been printed in convenient pamphlet form. It provides for two classes of membership; active, consisting of officers or employees of the Manila Electric Railroad & Light Company or its affiliated companies, who are members of the American Electric Railway Association or Class D members of the National Electric Light Association; and associate, any persons interested in the objects of the section and members of either of the national associations. Associate members have all privileges of active members except the right to vote, to hold office and to attend the meetings of the executive council.

There are no membership dues other than those required for membership in these associations.

The officers of the section are a president, a vice-president, a secretary, a treasurer and four directors. Three directors are elected, one each year, and the fourth is a member of the official staff of the company and designated by it. There are two standing committees, one on program and the other on membership. The latter is to consist of not less than one member from each department of the company represented in the section. This committee is to report to the executive council, consisting of the officers and directors, twice annually.

PUBLIC SERVICE COMPANY SECTION

The following program has been announced for the meetings of the Public Service Railway company section for this season and next. The program was inaugurated with the January meeting when the topics considered were: Historical review of the development of transportation, with particular reference to the organization of the Public Service Railway; discussion of a chart giving various constituent companies of the system, and dates of organization; and analytical review of cost of operation and maintenance for 1914, with suggestions for 1915.

February: Organization and financing of a street railway company. Explanation of stock and bond issues of an electric railway and the reasons for increasing them at various times.

March: Legal steps and obstacles in the formation of the organization. Procedure to be followed in securing franchise rights, property owners' consents, right of way, etc. Tribulations of the promoter.

April: Engineering work in surveying, preparation of plans and estimates, etc. Preparation of roadbed and construction of track and bridges.

May: Design and construction of power house and substation. Construction of line and distribution systems.

June: Design and construction of carhouses and shops. Equipment of shops and construction of rolling stock.

September: Determining the rate of fare, showing limits of profitable haul per unit fare.

October: Cost of operation, including platform expenses, superintendence, power, etc. Increased cost per passenger mile during commission hours. Cost of running extra car. Operating costs.

November: Maintenance of tracks and bridges. Maintenance of distribution system.

December: Social.

January, 1916: Maintenance of powerhouses and substations. Maintenance of equipment.

February: Claim Department. Welfare work. Costs of accidents. Costs of welfare work.

March: Overhead charges, general expenses, interest, taxes, etc.

April: What constitutes the value of a service corporation?

The above will be followed by six lectures on rates of return, valuation, regulation, franchise life, etc.

TRAINING OF TRANSPORTATION EMPLOYEES

The Transportation & Traffic Association committee on this subject, C. S. Ching, Boston, Mass., chairman, has just sent out data sheet No. 127 calling for information as follows: Rules and regulations of public service or railroad commissions and city ordinances relating to or affecting the employment of men on street railways; practice regarding the issuing of letters or the posting of notices of commendation in cases where employees may have been commended by the public or may have performed meritorious acts; practice regarding the publication of company magazines to which employees contribute, and the issuing of pamphlets on general topics, such as courtesy, etc.; opinions and experience regard-

ing employees' meetings and programs therefore; probation periods and discipline; watch inspection and standards, and bonding conductors.

COMMITTEE ON COMPANY SECTIONS AND INDIVIDUAL MEMBERSHIP

The chairman of this committee, Martin Schreiber, engineer maintenance of way Public Service Railway Company, Newark, N. J., is preparing an instructive pamphlet on the advantages of company sections. The committee hopes to assist in the formation of several company sections this year. One of the most promising prospects is the Chicago Elevated Railways which has a thriving "Chicago Elevated Railway Club." The Chicago club has a membership of more than a hundred and definitely expects to enroll as a company section of the American Electric Railway Association, probably this year. It gives every indication of having a membership of 150 before the end of the year.

JOINT COMMITTEE ON OVERHEAD AND UNDERGROUND LINE CONSTRUCTION

A largely attended meeting of this committee was held at the New York Railroad Club rooms, 30 Church street, New York, on Jan. 27. The discussion was of a general nature.

COMING COMMITTEE MEETING

Feb. 19, and 20 (if necessary), 10:00 a. m., New York, committee on way matters of the Engineering Association, C. S. Kimball, engineer maintenance of way Washington Railway & Electric Company, Washington, D. C., chairman.

Annual Meeting U. S. Chamber of Commerce

The third annual meeting of the Chamber of Commerce of the United States was held in Washington, D. C., on Feb. 3, 4 and 5. At a meeting of the national council before the convention on Feb. 2, Harvey S. Chase, Boston, spoke in advocation of a national budget in order to give citizens a more intelligent understanding of the financing of the government. At the opening meeting of the chamber on Feb. 3, President John H. Fahey, Boston, described the progress of the Chamber of Commerce into its present position as the largest, most representative and most democratic organization of its kind in the world. He told how the Chamber was performing its functions of crystallizing the business opinion of the country in legislative matters and of bringing into closer co-operation the business men and the government.

At the afternoon session on Feb. 3, William Jennings Bryan, Secretary of State, discussed the factors that enter into the extension of American trade in foreign lands, the advantages of the administration shipping bill and the work of the Department of State in establishing amity and good-will between foreign nations and this country. Following Mr. Bryan, Samuel McRoberts, vice-president National City Bank, New York, outlined government co-operation with business through consular channels and diplomatic intervention, and said that a campaign of education and publicity regarding foreign trade and enterprises was necessary. At the evening session the feature was an address by President Wilson. The most serious reference made was that the anti-trust laws should be amended so as to make it possible for American business houses, particularly the small firms, to band together for common action in the export trade, provided they did not form combinations to exclude any manufacturer or exporter.

In discussing trade expansion and the European war on Feb. 5, Edward A. Filene, Boston, recommended that business men should begin a national discussion of peace terms as a means of helping to end the European war, that banks should do more pioneer work for trade expansion, that foreign trade contracts should be protected by insurance and indemnity provisions and that the Chamber of Commerce should adopt a quality stamp for the goods of its members. Other papers and reports were of less interest to electric railways.

Presentation of Brady Medals

The ceremony in connection with the presentation of the Anthony N. Brady memorial medals for safety work on electric railways occurred at the annual meeting of the American Museum of Safety, Feb. 10. This meeting was held in the auditorium of the United Engineering Societies' Building, New York, and four other medals were presented and addresses were made on the work of the museum during the year. President Wilson sent a message to those at the meeting saying that he was very much interested in the effort made to conserve life and safeguard health by the museum. The dies for the medals are now being cut according to the accepted artist's sketch published on page 239 of the issue of Jan. 30, and the medals will be delivered in due course.

The speech in connection with the presentation of the medals was made by Prof. F. R. Hutton, chairman, jury of award of museum medals. The gold medal was awarded to the Boston Elevated Railway, and the speech of acceptance was made by Gen. William A. Bancroft, who said that he realized the honor conferred by the award and expressed the appreciation of the company for it. Russell A. Sears of the legal department and Henry V. Neal of the mechanical department of the company, to whom were respectively awarded the silver and bronze replicas, were also present. In his presentation speech Prof. Hutton referred to the fact that the jury of awards had made honorable mention in its report of the Public Service Railway of New Jersey and the Northern Ohio Traction & Light Company. E. W. Heilig of the former company and E. A. Clinedist of the latter company were the representatives of those companies in attendance.

At the same meeting the E. H. Harriman memorial medal, which is awarded to the steam railroads each year under very similar conditions to those covering the Brady medal and the electric railways, was presented to the New York Central Railroad. A. H. Smith, president of the company, received the medal for the company. Mrs. Anthony N. Brady and Mrs. E. H. Harriman were among those seated on the platform.

Berlin Stadtbahn Will Test High-Tension Direct Current

In the *Elektrotechnische Zeitschrift* for Dec. 24, 1914, Dr. Zehme states that the Prussian State Railways have decided to test high-tension d.c. motor car third-rail operation as well as single-phase equipment in connection with the Berlin Stadtbahn electrification. The sum of $6,250,000 has already been granted by the Prussian Diet for this electrification. This change in plans is the result of the government's study of recent progress made in high-tension d.c. operation.

The experiments will be conducted on the Wannsee-Stahnsdorf branch of the State Railways with a 1600-volt third rail, four motor cars and six trailers. Dr. Zehme suggests that the experimental section, which later would form a part of the electrified network, be so equipped that the third-rail voltage could be raised later to, say, 3000.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Fixed Squeegee for Vestibuled Cars

BY A. R. JOHNSON, ASSISTANT TO SUPERINTENDENT OF EQUIPMENT THIRD AVENUE RAILWAY SYSTEM, NEW YORK

In remodeling about 630 convertible cars to the pay-within type the Third Avenue Railway System, New York, realized that the removal of the bulkheads necessitated some means of keeping the vestibule sash free of rain, snow and ice with the least discomfort to the passengers and also of avoiding accidents from clouded sash. To attain this end a fixed window cleaner or squeegee was devised. This cleaner consists of two pieces of ⅛-in. x ¾-in. strap iron with a strip of rubber clamped between them, the straps being bolted to the two center vestibule posts. Where the straps project beyond the posts they are twisted, their ends being secured by means of two thumbscrews. Furthermore, springs are set between the straps and the posts to allow clearance between the sash and the straps while permitting close contact of the sash and rubber. The squeegee extends across the bottom vestibule sash, which is stationary, and close to the upper stile of the same in order to be out of the way. As the top center sash is lowered and then raised by the motorman, the outer side of the pane is swept by the rubber tongue so effectually that rain streaks and snow are readily cleaned off.



FIXED SQUEEGEE FOR VESTIBULED CARS

Recording Progress in Construction of Cars and Assembly of Equipment

BY NORMAN LITCHFIELD, M. E.

The modern electric multiple-unit motor car is a highly complex machine requiring in its construction the completion of a number of processes at the works of the car body and truck builders, and also necessitating for its full equipment the assembling of multitudinous detail parts after the main body and truck structures are completed. It is often advantageous for the railway company to purchase various specialties such as doors, seats, etc., directly from the manufacturers instead of from the car builders, and if this course be followed then it is essential that these parts be delivered to the car builders at a sufficiently early date to permit the prompt construction of the cars to proceed without interruption from lack of material.

It is often impossible to place the order for these parts at an earlier date than that of the order for the car bodies themselves, and it becomes, therefore, a difficult matter to keep track of the various items and to be able to ascertain quickly just what material is coming forward properly and what needs attention to insure its arrival in time.

In the same manner parts may be bought separately for the trucks, such as wheels, axles, springs, etc., and

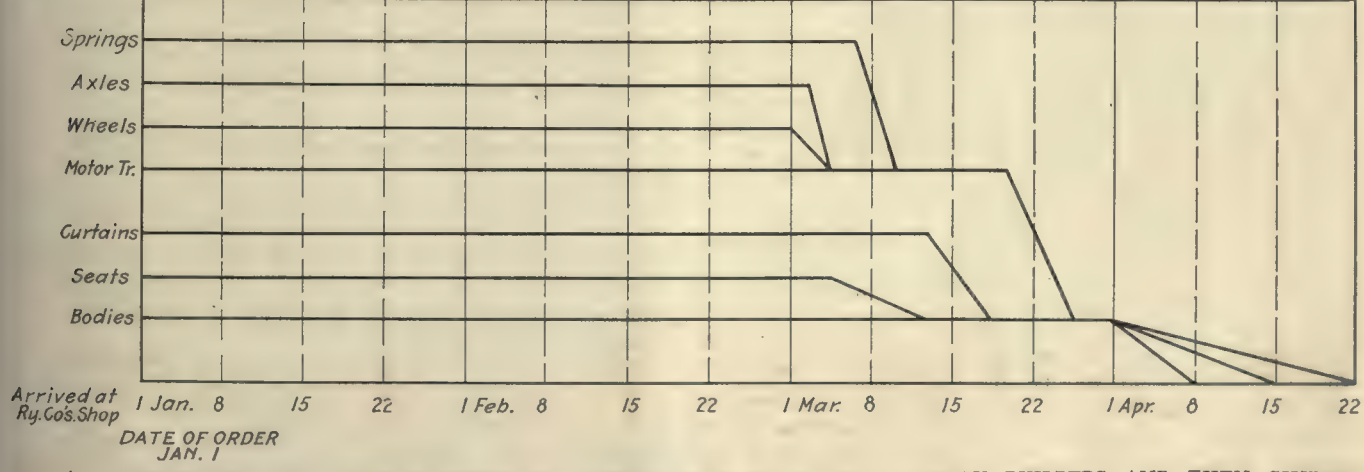


FIG. 1—CO-ORDINATION OF PARTS DELIVERED FOR ASSEMBLY AT TRUCK AND CAR-BODY BUILDERS AND THEN SHIPPED TO RAILWAY. THE DIAGONAL LINES INDICATE THE TIME THAT THE MATERIAL IS IN TRANSIT

they must reach the truck builders at specified dates. Furthermore, if the trucks are built by contractors other than the body builders and it is desired that the cars be shipped on their own wheels, then it must be seen to that they arrive at the car builders' works at the proper time.

All of these matters involve considerable accounting, and numerous methods have been devised to prevent the tangles that arise when shipments of materials fail to meet the progress in construction. The problem becomes more complicated when, as is often the case, the contract for the bodies and trucks is divided among several firms for reasons of economy, convenience and quick delivery.

Some railroads permit the car builders not only to build the body and truck structure but also to assemble the electrical and brake equipment on the car. Other roads prefer to send a force of their own men to the car builders' works and do that work themselves. Still others have the car builders do only a very limited amount of strict equipping work and wait until the cars arrive at the railroad's own shops before applying the equipment. The deliveries of material to the company's own shops then have to match with the progress in the construction of the cars at the builders and also with the progress obtained in the equipment of the cars at the home point.

As in all other matters, an orderly procedure, well and definitely recorded, has proved not only convenient but economical in this work, and the following method has proved its worth in a series of construction jobs of considerable magnitude.

As soon as arrangements have been definitely completed with the car-body builders, and an agreement has been reached in regard to the promised rate of delivery, a chart is made up as shown in Fig. 1. This chart gives a list of the parts to be furnished to the car and truck builder, and the approximate dates at which they should be delivered. This form, with the aid of the diagonal lines, shows at a glance at what date the wheels, etc., must be delivered to the truck builders in order that the trucks may be completed to be shipped in their turn to the body builders in time to meet their requirements. Requisitions are then made in manifold, giving the number of each article required for the complete job, a description of the material and reference to the detail blueprint number and specification number, and date of desired delivery. In addition to the copies forwarded to the purchasing and storekeeping departments, copies are furnished to the material clerk of the car equipment department, the engineer's office, the construction foreman and the inspector at the works of the car builder.

From these requisitions, file cards are made out and handled by the material clerk in a regular card index system, with the usual follow-up methods. The value of the card index for this work is very great, but on account of the great number of detail parts, each varying in the number required per car, and made by numerous different manufacturers, it is very difficult, almost impossible to be sure that some items have not fallen behind in their delivery and will cause a serious delay by their non-appearance. In other words, a comprehensive, lucid picture is lacking.

For this purpose the charts shown in Figs. 2 and 3 have been devised. These charts have been in successful use for some years. Fig. 2 is a chart of progress at the works of the car and truck builders. This chart, made on tracing cloth, is held at the railroad company's home office, and its chief value lies in the fact that the unit used throughout is that of the complete car, and not the detail itself, i.e., if twenty ½-in. x 3½-in. machine bolts are required per car and up to date 200 have been delivered, then they are shown on the chart, not

SPECIFICATION NO.	DATE BIDS SENT IN	NO. PER CAR	REQUISITION NO.	DATE OF ORDER	MANUFACTURER	ITEM	5	10	15	20
					A	Cars Complete				
						" in Trimming Dept.				
						" with Roof & Iron Painted				
						" " 3rd Coat Varnish				
						" " 2nd " "				
						" " 1st " "				
						" Lettered				
						" 2nd Coat Color				
						" 1st " "				
						" Rubdown				
						" Staining				
						" 3rd Coat-Surface No. 3				
						" 2nd " " "				
						" 1st " " "				
						" Putty				
						" with Coat-Surface No. 2				
						" " " Metallic Primer				
						" " Brake Rigging Applied				
						" "Cement Floor Laid				
						" "Inside Finish Applied				
						" in Finishing Dept.				
						" Sand Blasted				
						" Side & Roof Sheeting Painted				
						" Super Structured				
						" Underframe				
508-A	7-16-12	12	84	3-1-13	B	Seats				
80	"	20	80	"		Curtains & Fixtures				
507	"	2	"	2-1-13		Air Reservoir				
507-A	7-26-12	2		"		Air Brake Cylinders				
	8-30-12	2 Sets	103	"		Door Hanger overhead Track				
					C	Motor Trucks Complete				
						80%				
						60%				
						40%				
						20%				
						10%				
48-B	7-16-12	2	81	8-9-12		Wheels				
11-E	"	1	"	8-8-12		Axles				
	3-15-13	1	215	3-20-13		Gears				
511-E	9-18-1	2	116	4-25-12		Elliptic Springs				
"	"	2	116	9-25-12		Double Coil Springs				
	11-11-12	2	144	11-25-12		Journal Boxes				
					D	Trailer Trucks Complete				
48-B	7-16-12	2	81	10 24-12		Wheels				
48-B	"	1	90	8-8-12		Axles				
511-B	9-18-12	2	116	9-19-12		Single Coil Springs				
	11-11-12	2	144	11-25-12		Journal Boxes				

ORDER NO.	NO. PER CAR	REQUISITION NO.	DATE OF ORDER	MANUFACTURER	ITEM	5	10	15
		344		A	Cars Completed			
		"			" 80%			
					" 60%			
					" 40%			
					" 20%			
					" 10%			
					" arrived at Ry. Shops			
	2	244	1-9-13		Motors			
	2	"	"		Master Control			
	1	"	"		Reverse Handles			
	1	"	"		Line Switches			
	1	"	"		Motor Resistances			
	2	"	"		Fuse Blocks & Fuses			
	2	"	"		Main Fuses & Boxes			
	1	"	"		Control Junction Boxes			
	1	"	"		Limit Switches			
	2	"	"		Plow Sockets			
	2	"	"		Plow Socket Plugs			
	6	"	"		Control Circuits & Fuses			
	1	233	3-6-13	B	Cut-out Cocks			
	1	"	"		Compressors			
	1	"	"		Suction Strainers			
	1	"	"		Pump Gov.			
	1	"	"		Safety Valves			
	2	"	"		Brake Valves			
	1	"	"		Brake Valve Handles			
	2	"	"		Air Gages			
	2	"	"		Exhaust Mufflers			
	3	"	"		Drain Cocks			
	2	87	4-12-13		Cab Heaters			
	8	"	"		Truss Plank Heaters			
	12	"	"		Seat Heaters			
	2	103	2-1-13		Pneu. Cylinders			
	2	"	"		Plunger with rolled Pins			
	2	"	"		Trip Bars Complete			
	8	"	"		Movable Brackets			
	16	"	"		Pivots for Supp. Angles			
	4	"	"		Door Shoe Cams			
	1	"	"		Ratchet Foot Switches			
11901	4	367	8-29-13		Red Seal Batteries			
8585	2	180	4-26-13		Collapsible Shoes R.H.			
"	2	"	"		" " L.H.			
4332	2	"	3-13-13		Headlight Frames			
8464	2	202	5-17-13		Coin Register & Fare Boxes			
9920	2	283	5-17-13		Wheel Guards			
9902	2	211	5-16-13		" " Hoods			
8645	2	216	4-5-13		Motor Support Spring			
"	2	"	"		" " "			
8726	2	"	"		" " Spring Bolt			
	1	215	3-20-13		Pinions			
9161	2	216	4-5-13		Washer No 1			
"	4	"	"		Washer No 2			

FIG. 2—PROGRESS OF CARS, TRUCKS AND PAINTING; FIG. 3 PROGRESS IN DELIVERY TO HOME SHOPS

as 200 bolts but as twenty cars. Each day the reports of the inspector at the car builders' works as to the progress in the construction of the cars are noted on this chart and in conjunction therewith the progress in delivery of material. For material which has been shipped but not yet arrived the chart is cross-hatched, and for material delivered and found O. K. it is filled in solid.

Fig. 3 shows a similar chart for material delivered to the company's own shops and the rate of progress in turning out the cars complete for service.

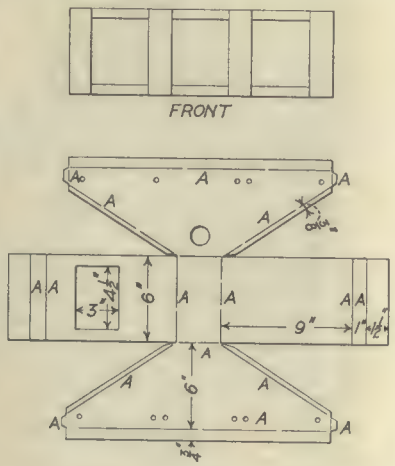
These charts permit the executive to see at a glance whether any items are falling behind. Thus in Fig. 3 it is evident that the delivery of heaters and batteries must be pushed if work is to proceed at the desired rate.

The charts give a ready picture of the status of the work from the placing of the order for the car bodies to the placing of the complete cars in service. Together with an index card file system they have furnished a satisfactory solution of the equipment problem.

Illuminated Train Number Box

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTERURBAN RAILWAY, ROCKFORD, ILL.

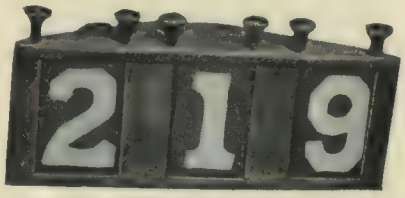
The accompanying sketch of our train number box shows one that is very easily made in any railway shop. The body of the box is cut from a single piece of tin or light galvanized iron. If cut according to measurements no trouble will be experienced. All lines marked *A* must be turned at a clean sharp angle, a machinist's vise being used for the purpose. After the bends are made the box is ready to solder together. The divisions that separate the numbers are made of two strips of tin 1½ in. x 6 in. in size, soldered to the front of the box as shown in the sketch. The round hole shown is for an ordinary sign socket, preferably of Federal type. The rectangular hole, 3 in. x 4½ in. in size, is for the door on the outside of the box. Two U-shaped slides are soldered to the box to hold the door in place. This door is made from a piece of tin or iron and has a small loop soldered thereto for convenient removal. The door gives access to the box when it is necessary to replace the lamp.



PATTERN FOR CUTTING OUT TRAIN NUMBER BOX

The number strips are made of painter's white muslin placed against a black background. These numbers run from 1 to 9 and 0. One strip is furnished with an *E* to designate extra trains. All strips are also provided with a black blank to be used when fewer than three numbers are needed. These number strips are glued at the ends to ½-in. x 6-in. wooden rolls. These rolls have a ¼-in. hole through the center through which the operating rod passes. For such operating rods we use trip rods from GE ML-2 circuit-breakers. However, a piece of ¼-in. round iron will answer the purpose if provided with some sort of a knob with which to turn it. The rods pass through the small holes shown in the sketch and through the hole in the wooden rolls. They are held firmly in the rolls by friction.

The boxes are placed in the center front window of the car and are supported by iron or brass brackets



TRAIN NUMBER BOX

screwed to the sash. In wiring, enough slack is left so that the motorman can lift the box out of the brackets while changing the numbers. The light can be wired either in series with one of the car circuits or with the marker and classification light circuit.

Voltmeter Measurements of Direct Current

BY G. H. McKELWAY, DISTRIBUTION ENGINEER BROOKLYN RAPID TRANSIT SYSTEM

Practically all engineers are familiar with the use of a voltmeter for determining current in a wire from voltage drop, but few of them have tables that will give them quickly and easily a statement of the amount of current in the wire causing the drop found. Generally, after the measurement has been made, it is necessary to look up in a table the resistance per 1000 ft. of the size of wire upon which the measurements have been taken and then calculate from that the amount of current.

Much time will be saved by using tables which give the number of amperes in each size of wire corresponding with a drop of 1 millivolt over any specified length. A table such as the following is a great help.

AMPERES PER MILLIVOLT

Size of Copper Wire	Number of Feet				
	1	2	3	4	5
5,000,000 circ. mils	476.0	268.0	158.6	134.0	95.2
2,500,000 circ. mils	238.0	134.0	79.3	67.0	47.6
2,000,000 circ. mils	190.4	95.2	63.4	47.6	38.0
1,500,000 circ. mils	142.7	71.4	47.6	35.7	28.5
1,000,000 circ. mils	95.2	47.6	31.7	23.8	19.0
500,000 circ. mils	47.6	23.8	15.9	11.9	9.5
No. 0000	20.1	10.0	6.7	5.0	4.0
No. 000	16.0	8.0	5.3	4.0	3.2
No. 00	12.7	6.4	4.2	3.2	2.5
No. 0	10.1	5.0	3.4	2.5	2.0
No. 1	7.9	4.0	2.7	2.0	1.6
No. 2	6.3	3.2	2.1	1.6	1.3
No. 3	5.0	2.5	1.7	1.2	1.0
No. 4	4.0	2.0	1.3	1.0	0.8
No. 6	2.5	1.2	0.8	0.6	0.5
No. 8	1.6	0.8	0.5	0.4	0.3
No. 10	1.0	0.5	0.3	0.25	0.2

An even quicker method is to measure off different lengths on different sizes of wire and so arrange these lengths that the current in the wire can be read off either directly from the indications of the millivoltmeter or with a constant of 100, 10, 1 or 0.1. This will avoid all figuring after the meter reading has been obtained.

LENGTH OF WIRE

Size of Copper Wire	Constant							
	100		10		1		0.1	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
5,000,000 circ. mils	4	9	47	7	..	..	..	..
2,500,000 circ. mils	2	4½	23	9½	..	..	..	..
2,000,000 circ. mils	1	11	19	9½	..	..	..	..
1,500,000 circ. mils	1	6	14	3¼	..	..	..	..
1,000,000 circ. mils	..	..	9	6½	95	3	..	..
500,000 circ. mils	..	..	4	9	47	7¼	..	..
No. 0000	..	..	2	0	20	1	..	..
No. 000	..	..	1	7	16	0	..	..
No. 00	..	..	1	7	16	0	..	..
No. 0	..	..	1	3¼	12	8½	..	..
No. 1	..	..	..	..	7	11	79	0
No. 2	..	..	..	..	6	3½	63	0
No. 3	..	..	..	..	5	0	50	0
No. 4	..	..	..	..	4	0	40	0
No. 6	..	..	..	..	2	6	25	0
No. 8	..	..	..	..	1	7¼	16	0
No. 10	..	..	..	..	1	0	10	0

Some objection may be made that the measurements just given are not close enough for very fine work, but they are close enough for anything required by engineers in the field. When it is remembered that ¼ in. in 5 ft. is within 0.5 per cent of the total distance few will dispute that the measurements are close enough for practical purposes and as close as can be readily measured on a wire. Even if the measurements could be made more exact it would be unnecessary, for with the fluctuating current in railway circuits any reading even approximating 0.5 per cent would be very close. For the reasons given, no correction has been attempted to allow for the change in the resistance of the conductor with varying temperature, the values given being correct for about 68 deg. Fahr.

Bridge and Building Inspection Report Forms

Rather unusual and extensive inspection report forms have been devised by the maintenance of way department of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill. A feature of these reports is that the same form serves for both the inspector's record and the department record. For example, the bridge and building inspectors are furnished with a loose-leaf binder, 5½ in. wide x 14 in. long, which may be slipped into a workcoat pocket. On this form the inspector records information as required and indicated in a reproduction of the form shown.

For the convenience of the men, a complete list of abbreviations is furnished at the bottom of each report form so that the inspector will be able to supply all the data required in the space allotted for it. In order that the report record, which is written in pencil, will be legible when it reaches the department office to be transcribed, each inspector is supplied with a 2-H pencil which is hard enough to prevent the writing from becoming unreadable.

Thorough inspections of bridges and buildings are made twice a year, in the spring to determine that no more material than was required at the previous fall inspection is necessary, and in the fall to determine the safety of the structure for winter operation, as well as to estimate what new material will be necessary for repairs for the following year. In addition to these inspections track foremen are required to inspect all bridges and culverts within their territories and report any unsafe or unusual condition upon its discovery. As a check against this inspection by the track foreman, the foreman of bridges and buildings inspects all timber bridges once each month, following which all defects needing immediate repairs are cared for promptly.

In connection with each way and structure inspection a list of the material needed is compiled by the foreman of the way department so that repairs may be made promptly and in accordance with his ideas as to what is needed.

CHICAGO, OTTAWA & PEORIA RAILWAY

BRIDGE INSPECTION REPORT

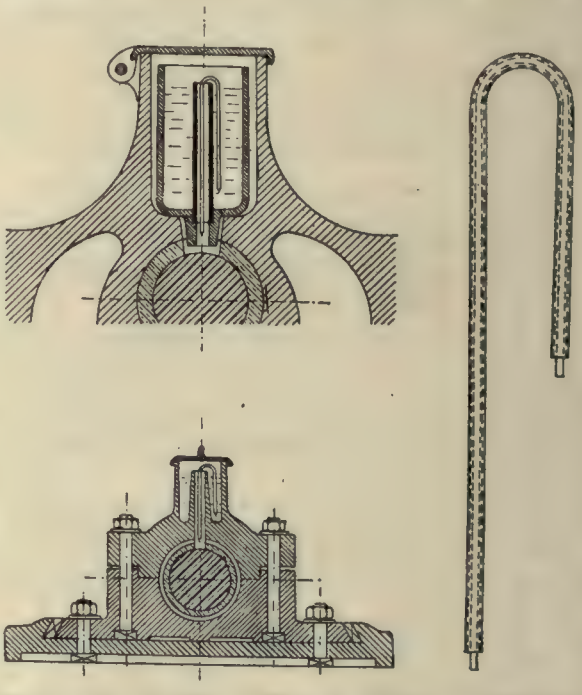
Bridge No.	Date Erected	Kind of Bridge or Culvert	No. of Spans	Length of Spans	Total Length	Size of Pipe or Culvert. Width First, then Height	Approximate Drainage Area	Date Inspected	Condition of Bridge and Description of Work to be Done	Material Required	Remarks

BRIDGE INSPECTION REPORT OF THE CHICAGO, OTTAWA & PEORIA RAILWAY

Siphon Motor Lubrication at Budapest

In 1908 the Budapest, Hungary, Railway installed on a number of its railway motors for experimental use a siphon lubricator invented by Joseph Zsarko, its chief engineer. The results under great variations of service and temperature were so satisfactory that the railway equipped all of its cars in the following year. Most of the motors are of the Westinghouse or Allgemeine types, made originally for grease lubrication. For this system the company substituted cast-iron cups equipped with the new lubricating device as illustrated.

This lubricator consists of a suction pipe in which a copper wire is inserted to increase the surface of contact for the transmitted oil; thereby clogging is practically obviated. The oil is conducted to the point of use in a uniform degree, the rate of flow being fixed in advance by selecting the proper diameter of pipe and wire.



DETAIL AND GENERAL VIEWS OF SIPHON LUBRICATOR

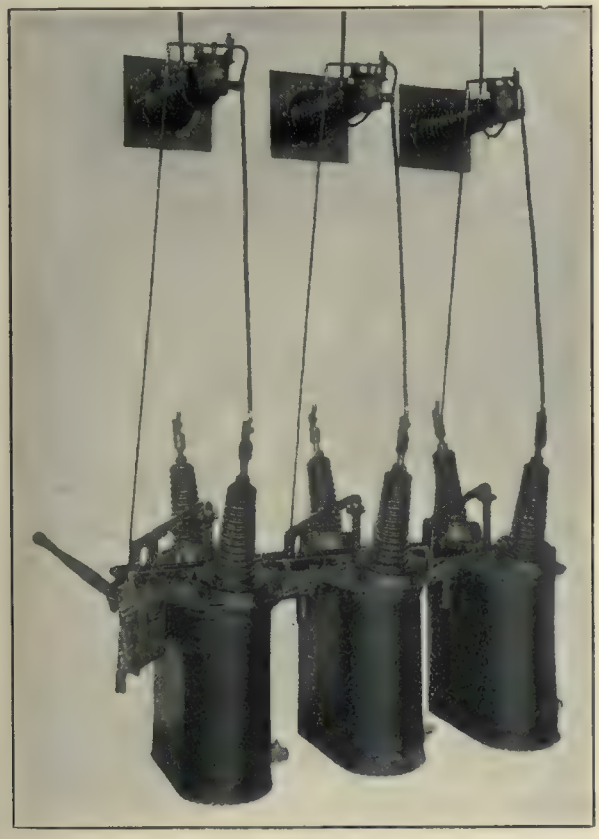
To start the lubricator, water is first drawn through the pipe, after which the shorter branch is dipped in the oil. The pipe will then fill with oil automatically and be ready for use with the expulsion of the water. The pipes can be maintained in perfect condition by blowing them out about once every three months. It is asserted that the saving in lubrication as compared with the grease is 75 per cent, and 50 per cent as compared with wick and oil lubrication. This lubricating system has given no trouble from freezing because the heat conducted from the bearing by way of the brass suction pipe actually will melt frozen oil at a greater rate than

is required for lubrication. The representative for the inventor in this country is Joseph Gelbert, who is in the way and structure department of the Brooklyn Rapid Transit System.

Series Trip for High-Voltage Oil Switches

Low-voltage current is usually employed to trip high-voltage automatic oil switches on the occurrence of abnormal conditions against which the automatic features are intended to guard. Electrically-operated switches are usually tripped by direct current; and for tripping hand-operated switches, alternating current is generally used. In many cases, however, neither low voltage direct current nor alternating current is conveniently or cheaply available; and then, automatic protection is secured by the aid of a high-voltage series trip.

For this service, the General Electric Company has developed an arrangement representing considerable



TRIPLE-POLE SINGLE-THROW 45,000-VOLT OIL SWITCH WITH TRIPLE-POLE TIME-LIMIT SERIES TRIP

improvement on types of high-voltage series tripping devices heretofore in use. The new features are: accessibility of the working parts for inspection; cleaning or adjustment while in service without danger; calibration at the oil switch itself, and not at the insulator supporting the series tripping solenoid; and the use of a new type of solenoid, which consists of but a few simple and rugged parts that need practically no attention whatever after installation.

The solenoid plunger is connected to the tripping mechanism of the oil switch by a wooden rod. Calibration, namely, change in current tripping values, is accomplished by a movable weight located near to the operating mechanism of the switch at a considerable distance from the high voltage current. This type of series trip is furnished for instantaneous or inverse time-limit operation. Time delay is obtained by means of a dashpot mounted on the tripping mechanism at the switch.

New Trolley Retrievers and Catches

The New Haven Trolley Supply Company, New Haven, Conn., is just placing on the market the "Sterling Universal" trolley retriever, and the "Sterling" trolley catcher. These devices contain a number of novel features. For example, only one weight retrieving spring is used in the trolley retriever. This spring



EXTERIOR VIEW OF TROLLEY RETRIEVER

can be adjusted to meet any tension of trolley pole desired, thereby making it unnecessary to carry in stock various sizes of retrieving springs. Action of the retrieving spring does not affect the service spring. It is asserted that these machines positively will prevent skipping or "walking up" of the pole after it leaves the wire. They contain very little mechanism, and the few parts are strong and simple. Repairs can be made without the use of tools other than a wrench with which to remove the case. The company absolutely guarantees for a period of five years all parts except springs. The springs, nevertheless, are said to be the best obtainable, and were designed specially for the characters of service required. Where desired, the company can supply machines that are interchangeable with present equipment.

Third-Rail Cable End Bell

A cable end bell for use in connection with feeders supplying third rails has recently been developed and placed on the market by the Electrical Engineers Equipment Company, Chicago, Ill. The desire for more adequate protection for this class of feeders by a large



THIRD-RAIL CABLE END BELL

electric railway in the West prompted the development.

The bell is so constructed that it can be mounted upon any size of iron pipe or fiber conduit, which is used in conducting the feeder cable. In case a lead-covered cable is used for the feeder, the lead sheath is cut away for a short distance from the end. The lead is then belled out so as to make a tight fit into the patented grounding clamp with which all of this company's end

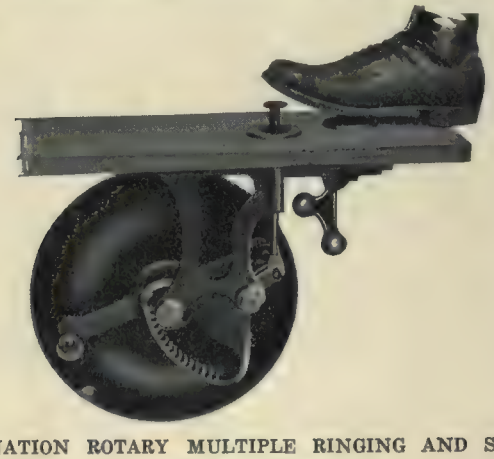
bells are equipped. The cable insulation is also cut away a few inches, depending upon the size, and a split tinned copper sleeve is slipped over the bare end. A similar sleeve is placed over the bare end of the rail cable which is introduced into the bell through a porcelain bushing. The two cables are then bolted rigidly together by means of a copper angle connector which fits over the copper sleeves. The bell can be used in connection with braided as well as lead-covered cables. This construction is shown in the accompanying cuts.

The lower portion of the bell is then filled with a compound completely sealing the cable, and the cover is put in place. This cover has been designed with an extension over the porcelain bushing to form a watershed which prevents moisture from entering the bell. By removing the cover and loosening the angle connectors the bell is readily made detachable. The completed bell forms a safe, simple and efficient means of protecting this class of feeders.

While designed originally to meet the specifications of one railway a number of other third-rail systems are now using the same equipment.

Modern Gongs

One of the two accompanying cuts shows a combination rotary multiple ringing and single stroke foot gong made by G. C. Reiter, Canton, Ohio. This gong gives forth a loud, clear ring which can be varied from a single



COMBINATION ROTARY MULTIPLE RINGING AND SINGLE-STROKE FOOT GONG

tap to a continuous alarm. No springs are used. The gong itself is made of a most resonant bell steel, the hanger and knocker wheel are of cast iron and the lugs,



SINGLE-TAP FOOT GONG

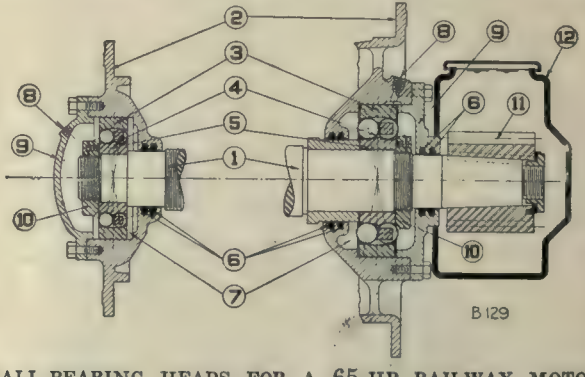
which are electrically welded to the gong, are of steel. The mechanism inside the gong includes a centrifugal internal gear connected to a pinion whose ratchets engage with teeth on the rocker arm. A black japan finish is usually employed to prevent oxidation, etc. Mr. Reiter also supplies gongs of simpler form, such as single-stroke foot or hood gongs and single-tap inside striking gongs. Although it is not generally known, this manufacturer not only makes gongs for every purpose but supplies a large number of those sold by the leading supply houses and car builders. These gongs are also used in large numbers by foreign tramways.

Ball-Bearings on Storage-Battery Cars

Arthur V. Farr, M. E., who is with the S. K. F. Ball Bearing Company, New York, has recently prepared the following summary of the value of ball bearings in electric railway service:

The necessity for extreme accuracy in energy consumption has made the builders of storage-battery cars lead in the use of anti-friction bearings for journal boxes and motors. Every tie-up required for charging or boosting and every percentage increase in the coefficient of friction of the bearings limits directly the application of this type of car.

A storage battery of given ampere-hour capacity is able to take the car over a definite schedule. The amount of the starting and tractive efforts determines, among other factors, the limitations of this schedule. The use of ball bearings has reduced the starting effort upward of 50 per cent, which makes possible either quicker acceleration, using the same size motor, or greater mileage on the one charge, using a smaller



BALL-BEARING HEADS FOR A 65-HP RAILWAY MOTOR

1—Motor shaft
2—Bearing head
3—Outer ball race
4—Balls and ball retainer
5—Inner ball race
6—Oil retaining grooves
7—Lubricant chamber
8—Tap for lubricant supply
9—Housing cap
10—Lock-nut to hold inner race
11—Driving pinion
12—Pinion casing

motor. Ball bearings in this way increase the sphere of application of accumulator cars, improving the running schedule and decreasing the number and duration of charging periods.

The reduced starting effort directly affects the battery characteristics. Battery efficiencies vary widely, depending upon the rate at which the battery is charged and discharged, and the extent to which the discharge has been carried when the charge is begun. High rates of discharge lower the efficiency, consequently types of axle bearings which necessitate heavy starting effort put a severe handicap on the storage-battery car.

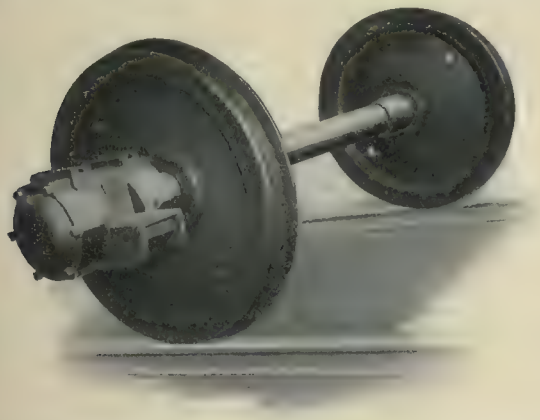
Ball bearings, besides decreasing the starting effort, permit the car to coast farther than where plain bearings are used. This coasting feature is so noticeable that it is possible to take advantage of even the slightest inclines. On the whole, actual tests have shown that an increase of 10 per cent in mileage may be expected from the use of ball bearings.

Almost, if not quite, as important to the car maintenance department is the saving in upkeep and inspection which results from the use of ball bearings. The saving in maintenance charges due to the freedom from hot journals, frequent lubricant renewals, repairs, etc.,

is held to be from 35 per cent to 70 per cent. This significant saving is due to the fact that where ball bearings are properly mounted they do not require adjustment or repairs and are free from the intrusion of dirt and grit.

The saving in the lubricant used on the car journals is about 85 per cent. The ball-bearing journals can be sealed so that there is no leakage out of the journal box, and it is not necessary to lubricate the bearings more often than once in three months.

The reason for the reduced friction of ball bearings is that they substitute rolling action for the rubbing



BALL-BEARING JOURNAL BOX FOR STANDARD 0-50 TRUCK—RADIAL LOAD ON EACH JOURNAL 6500 LB.

friction of plain bearings. With bearings that are self-aligning, binding or wedging action of the balls is impossible. Also, bearings with the double row of balls permit the use of twice as many balls per bearing to carry the load and consequently reduce the load carried by each ball.

Ball bearings on the driving motors increase the life of the driving gears by maintaining the gear center



CAMBRIA & INDIANA RAILROAD BALL-BEARING AXLES—CAR WEIGHT 59,100 LB. TRUCKS, BRILL 69-E

distances. To prevent rapid wear, gears must mesh properly. When plain motor bearings wear or the armature shaft wears, the entire driving strain is taken by the inside corners of the driving teeth, and rapid wear with frequent failure of teeth results. Ball bearings minimize bearing wear and eliminate shaft wear, keeping the gears properly in mesh.

The substitution of the rolling of ball bearings for the rubbing action of plain bearings reduces the bearing wear to an amount that is so small that it cannot be measured and consequently the armature air gap is maintained constant. This eliminates the danger of the armature falling on to the pole pieces and causing costly repairs. In fact, a prime cause of motor repairs is thus eliminated. Cars in the repair shop for motor trouble are generally there because of worn bearings, worn-out armatures, burnt-out armatures, etc., due directly to the fact that the plain bearings have worn down.

Editor Eichel on Conditions in Germany

In a personal letter to a member of the editorial staff of the ELECTRIC RAILWAY JOURNAL, Eugen Eichel, editor of *Elektrische Kraftbetriebe und Bahnen* has some interesting things to say on conditions in Germany at this time, particularly with regard to railway and electrical affairs.

Mr. Eichel says that the war has led to a relaxation in the police rules governing passengers standing in electric railway cars, so that it is now quite common to see a car carrying as many passengers as it will hold. Consequently, the railways are operating at a lower service cost than in times of peace.

A number of autobuses and automobiles are still running in Berlin with the consent of the war department, although rubber tires and gasoline are extremely costly. In many cases a mixture of gasoline and wood alcohol is used, as the latter is abundant in Germany. Gasoline is also manufactured largely in Germany as a by-product of the coal-tar industry, and as both tar and coal are at hand in large quantities the question of fuel is not a pressing one.

Naturally the war offers a very favorable opportunity for the exploitation of electric lighting and electric vehicles, since both gasoline and petroleum have risen in price very much. The military authorities who first installed petroleum lighting for barracks, military hospitals, encampments and prisoners' quarters prefer electricity wherever it is possible to make connections with existing central stations or transmission systems. The use of electricity is particularly valuable for prison camps because the wiring and lamps can be so arranged that the turn of a switch will flood any suspicious area with light. In connection with the prison camps, Mr. Eichel writes that large numbers of illiterate Russian prisoners are being taught to read and write.

The large electrical companies of Germany have done praiseworthy service in fitting out military hospitals with electrical apparatus for sterilizing, cooking, *x*-ray and electro-therapeutical purposes. The Siemens-Schuckert Company, in particular, has equipped part of its new main building as a hospital with 400 to 500 cots, including an all-electric kitchen.

War Affects Buenos Aires Underground

The Compagnie Générale de Tramways de Buenos Aires of Brussels reports that the first section of the Anglo-Argentine Tramways in Buenos Aires was opened for traffic in December, 1913, the length being 4.2 miles. During the first nine months of operation the average receipts, if applied to a whole year, would amount to about $368,000 per mile per anuum, as compared with $249,600 in Paris, $179,200 in London and $377,600 per mile in New York. As a consequence of the financial crisis in Argentina the construction of the second underground section has been indefinitely postponed, although the hope is expressed that an extension of time will be granted by the authorities. The European war has reacted unfavorably on Argentina and a reduction in the operation of the tramways is held in prospect.

News of Electric Railways

NEW YORK COMMISSION INVESTIGATION

Summary of Testimony of Commissioners McCall and Wood Before Legislative Committee

Edward E. McCall, chairman of the Public Service Commission of the First District of New York, was the witness before the legislative investigating committee on Feb. 4. He was examined first as to the methods and scope of the commission. Mr. McCall explained that he took the position because he believed a crisis had arisen in the subway contract situation. The commission was divided two to two over the dual system now well under way. He cast the deciding vote, after considering the matter five weeks. Five commissioners were necessary to the work of the commission. Colonel Hayward, counsel for the committee, recited the record of work outside of the commission on which Mr. McCall had been engaged during his early connection with the commission, to show that Mr. McCall had spent fifty-seven days in court or sitting as a referee and had missed nine stated meetings of the commission. Mr. McCall expressed the opinion that the jurisdiction of the commission should be extended so as to take in more of the Long Island Railroad and all Westchester County. He favored the first district commission looking after the New York telephones. He did not believe that any of the transit managers were disregarding the people's interests. He did not favor turning over the supervision of the construction of the new rapid transit lines to the Board of Estimate.

At the hearing on Feb. 5 Mr. McCall said that he was familiar with the conditions at the Brooklyn Bridge in rush hours and that he often used the subway. The fleet of automobiles of the commission consisted of five autos and two trucks. Colonel Hayward read into the record the chauffeur's slips. Mr. McCall explained that he was accustomed after his work at the office to ride in the commission's car toward his country home until he was met by his own and could transfer to it. All the rides were taken for the public service. His experience showed that a commissioner could not possibly practice law. He found that if he tried to do so he would break down. Mr. McCall considered that the civil remedies were adequate for the commission's purpose. He did not believe it was ever intended that the commissioners should seek an indictment for misdemeanor because a train was five minutes late or twenty-five people were standing in one place for ten minutes. He referred the committee to Commissioners Maltbie and Williams when the question of security issues was brought up.

Robert Colgate Wood, the member of the Public Service Commission appointed from the Bronx about eight months ago by Governor Glynn, was the witness on Feb. 6. He had been solicited to take the appointment. He was not a lawyer and had had no administrative experience except as a corporation director and in contract work. His lack of exact knowledge of the commission law he attributed to his short term of service with the commission. He consulted counsel for the commission in regard to all matters concerning the law. He had been active in public service corporation work only with the New York City Interborough Company and the Lincoln Gas Company, but retired from the former seven years ago. This experience had been valuable to him in his commission work. The property of the New York City Interborough Company was now included in the system of the Third Avenue Railroad. Mr. Wood had two telephones to his office in the commission, one connected through the local switchboard in the commission office and one, a personal wire, connected with the telephone central at headquarters. Mr. Wood did not know whether other commissioners had similar unlisted wires. He understood, however, that there had always been two wires connecting his office. In this connection Senator Foley, the Tammany member of the investigating committee, explained that everybody in public service had a private wire. The testimony showed that Mr. Wood had paid personally for his private wire.

The hearings were resumed on Feb. 10.

In consequence of the attention that the legislative committee has devoted to the regulatory side of the commission's functions as apart from its work in providing for the dual subway system, the commission has caused to be issued a statement of what it has accomplished in the way of regulating public utilities since its creation on July 1, 1907.

BAY STATE ARBITRATION HEARINGS

Testimony by Prof. Irving Fisher of Yale University in regard to the cost of living was the feature of the Bay State Street Railway arbitration at Boston during the week. In general Professor Fisher's evidence dealt with the relation between the cost of living and the shrinking value of the dollar, which topic is discussed at length in Professor Fisher's book, "Why the Dollar Is Shrinking," reviewed in the ELECTRIC RAILWAY JOURNAL of Jan. 30, 1915, page 264. Under cross-examination by Attorney James M. Swift, counsel of the company, Professor Fisher said that the expense of increasing the wages of employees should be laid upon the passengers. He said in conclusion: "It seems to me that the true solution for this difficulty into which the world is put by the rising cost of living and the shrinkage of the dollar, is for the railroads to raise their rates. That course was granted to a limited degree for the steam railroads against opposition with which I have no sympathy. I think it may well be true that the electric roads will come to the same necessity of raising their rates over the fixed 5-cent fare, to a 6-cent or a 7-cent fare, or a fare that changes from time to time like other prices in the community. This depreciation of gold necessitates the raising of all prices to correspond."

Professor Fisher held that almost all the large public problems of the day were due to the fact that the prices of commodities, labor, and of public service do not move together. He advanced the opinion that in reality the adjustment was not taken out of the passenger, because he got higher wages and income himself. In response to an inquiry by Chairman Pelletier, the witness said that the company should increase wages first and then apply to the Public Service Commission for permission to establish higher rates of fare, along the lines followed in the Middlesex & Boston Street Railway case, which offered an excellent precedent.

FRANCHISE UPHELD

Supreme Court of Minnesota Decides in Favor of the Duluth Street Railway

An important decision concerning the validity of the franchises of the Duluth (Minn.) Street Railway was rendered recently by the Supreme Court of Minnesota. The case was brought before the court on quo warranto proceedings by the Attorney-General of the State and was tried first in the District Court, where a decision was rendered in favor of the company on May 23, 1914. The contention of the State was that the original franchise of the company, granted in 1881, provided that the company should build 1 mile of street railway within one year of the date of the grant; that while the company did lay such a mile of track, the line was not equipped and put in operation until some months later after it had been reconstructed; that consequently the terms of the franchise had not been complied with, and since then the company had been operating on the street merely on sufferance and not by virtue of its contract. The company's claim was briefly that the State and the city, after thirty years' acquiescence and recognition of the franchise, was now estopped from raising any question on its validity.

In the trial in the lower court it was brought out that since the railway had been in operation, various actions had been brought against the company by the city and State on taxation and other matters, and that during this time there had been no claim, with one exception, which was not material, that the company was not occupying the streets by virtue of its franchise, and that the city had levied taxes on the company in which the franchise was assessed at a large sum. It was also shown that the company had sold securities to

the public, based on the validity of the franchise, that these securities had been purchased in good faith and that the company had been encouraged to do this because the city during this long period of time had never disputed the validity of the franchise. In view of these facts the court held that even had there been any failure to meet the terms of the franchise, action now was barred by the statute of limitations.

The court did not deny that a statute may create a self-executing forfeiture, but it held that none of the cases cited where such self-execution was held to have occurred contained facts especially like the case in question. The court held that the intent of the Legislature in the original grant was to have a railway built, but that the terms on which it should be built were largely of local concern. This was shown by the fact that the city could require extensions. Moreover, the city in 1882 had consented by formal resolution to a postponement of operation, and the railway was in operation within the time fixed by this last resolution.

The court finally held that as the franchises of the company were granted in 1881 for a period of fifty years, they would not terminate until 1931.

LEGISLATION IN INTEREST OF TORONTO

The Council of Toronto, Ont., has decided to oppose the application of the Metropolitan Radial Railway for power to lay double tracks on Yonge Street within the city limits; to apply to the Legislature for a declaratory act restoring the order of the Ontario courts declaring the Toronto Suburban Railway was liable to restore pavements as well as to repair, and to give the same definition to the word "tracks" as given by the courts; to seek an order for the cancellation of the company's franchise within the city limits for having refused to carry out the provisions of the agreement, and to give the city power to take over the system on similar terms to which it took over the Mimico & Scarboro divisions of the York Radial. A special committee has been appointed to confer with representatives of the Harbor Board and the Provincial Hydro-Electric Power Commission and consider and report upon a plan for a rapid transit system for the city and for the entrance of the radial lines. It was also decided to apply for an act declaring that the agreement between the city and the Toronto Railway means that the company is compelled to extend its tracks and to operate a service within the limits of the city as they may exist at any time, and not solely within the old limits of the city; for the confirmation of the Barnes report suggesting the company spend $2,950,000 on new cars and extensions; for an amendment to the assessment act to provide for the assessment of railway rolling stock, and for the imposition of a percentage tax on capital stock of the railway companies. The Mayor's proposal that application be made to the Ontario Railway Board for an order compelling the Metropolitan Railway to reduce its fares within the city limits was referred back to the Board of Control, as was his suggestion that power should be sought to enable the city to purchase and operate a system of motor busses.

At a joint meeting of the members of the City Council of Toronto, the Harbor Commissioners and Sir Adam Beck, representing the Hydro-Electric Power Commission of Ontario, on Feb. 4, it was decided that the engineers and legal advisers of the three bodies should confer on the legal and engineering aspects of the transportation situation and that the engineers should prepare a general scheme for a rapid transit system for the city and suburbs, embracing a common entrance for the radial lines on the north, west and east of the city. Sir Adam Beck said the Government intended to oppose the granting of new franchises to electric companies and refuse an extension of time for construction to those who had obtained franchises in the past. The Provincial Hydro-Electric contemplated the construction of 1600 miles of radials in the province, and the success of the system depended upon being able to obtain an entrance into Toronto, the hub of the system. As soon as the engineers have prepared the general scheme for the radial railways it will be submitted to the conference, the object being to advance the project so that it may be submitted to the people at the next municipal elections.

INDIANA LEGISLATURE

The following new bills have been introduced in the House: a bill providing that the officers of all incorporated companies in the State shall send annually to the stockholders a report of the business transacted; a bill providing that newspapers may contract with railroads for advertising, taking mileage or transportation in payment for the same; a bill providing for the regulation of labor for hire, for the adjustment of all controversies arising therefrom by arbitration, and that all labor for hire shall be "compensated on a truly competitive basis."

The following bills have been killed in the House: House bill 554 of the 1913 session, which was vetoed by the Governor after the Legislature adjourned in March, 1913, providing that railroad engineers be permitted to run their trains across electric railway tracks without stopping; bill for amendment providing that towns of 500 population can order the installation of protective signal devices or flagmen at railroad crossings; bill providing for installation of suitable signs at railroad crossings, cost to be borne between township and companies; bill providing that electric railways shall pave between the tracks with the same material that is used for the remainder of the street.

A bill has been passed by the House providing that steam and electric railways shall maintain station flagmen or automatic signal devices at all crossings where the view is obstructed, provided a petition for such man or device is presented by five freeholders.

The following new bills have been introduced in the Senate: a bill providing certain regulations for the ventilation of street and interurban cars and passenger stations; a bill providing that where a public utility does an interstate business the rates charged in Indiana shall be no greater than the rates charged by the utility in another State; a bill providing for a uniform bill of lading to be used by all shippers; a bill making uniform the law in regard to transfer of stocks of corporations; a bill making it unlawful for a public service corporation to supply service to another State unless a schedule of rates charged in the foreign State shall first have been filed with the Public Service Commission of Indiana; a bill prohibiting the payment of dividends by corporations unless the dividends have been actually earned; a bill prohibiting any person from acting as a director in any corporation unless he is a bona fide stockholder in such corporation; a bill giving the Public Service Commission power to order the separation of grade crossings in cities of 20,000 population or less.

The bill to prevent public utilities from diverting funds or assets after an examination of the property of the company has been ordered by the Public Service Commission has passed the Senate.

STORM IN ONTARIO

The whole Province of Ontario was in the grip of the storm king on Feb. 2. In one of the worst gales which has swept over the province during the past decade, Toronto was cut off entirely from railway communication for more than eight hours. The storm paralyzed radial traffic in and out of Toronto. During the morning all traffic was practically at a standstill, and only the snowplows were able to make headway against the gale. These were of little practical use, however, as the wind swept the drifts over the tracks again. The Toronto Railway ran cars without any attempt to keep to the schedule, and residents of the eastern and western sections were without service for more than three hours. About noon, however, the street railway officials succeeded in bringing about the opening of all lines in the city.

The Galt, Preston & Hespeler Railway ran sweepers all night in Galt so as to keep the line open. The service was irregular. Street railway service in Guelph has practically been out of business since Jan. 30. The electric railway service between Woodstock and Ingersoll was completely tied up. The Hamilton Street Railway operated cars all night in order to keep the system open. In Kingston steam and electric railway service was demoralized and business was practically at a standstill, and in St. Thomas the street railway system was tied up all day and the electric line from St. Thomas to London and Port Stanley was blocked.

CLEVELAND MATTERS

The opinion prevails in Cleveland that the Council will not authorize the Cleveland Railway to purchase some additional auto busses to determine their adaptability for passenger business. John J. Stanley, president of the company, said recently that a dozen busses in addition to the two now in use would be necessary to test their work on East Thirtieth Street, as is proposed in the Stolte resolution now before Council. He is not in favor of the plan.

City engineers have reported that the plan to build a subway under the Cuyahoga River, in connection with the elimination of a dangerous bend near the site of the proposed Lorain-Huron bridge, is feasible. Councilman Moylan requested the investigation in the belief that a tube could be built in connection with the construction of the bridge and that it could be used by a rapid transit line in the Walworth Run valley.

At a recent meeting of the Lakewood Chamber of Commerce it developed that Lakewood is willing to grant the Cleveland Railway an extension of franchise in return for the extension of the West Madison line from West 117th Street to Riverside Avenue, Lakewood. The company desires the franchise to expire with that of the Tayler grant in 1934. The plan would give the Lakewood people 3-cent fare within their own city.

ONTARIO RAILWAYS UNDER COMPENSATION ACT

The steam and electric railways of the Province of Ontario learned through their representatives on Jan. 15 what the Workmen's Compensation Commission expects of them under the operation of the compensation act. Lawyers representing the different companies called upon the commission and went fully into the subject of their responsibilities and duties under the act. The board pointed out the procedure established. The railways are in Schedule 1 of the act, which means that while they are under the general provisions of the measure they are not brought within the grouping system, each company being held individually liable for the compensation due a workman or his dependents in case of injury or death. According to the board's plans, when a workman is injured or killed, the company must at once notify the commission, supplying a physician's report and other data. The commission passes upon the case, fixes the compensation due the workman and notifies the company. A check for the amount fixed must then be forwarded to the commission, which places it upon record and sends it on to the workman. In every respect the employee of a railway receives the same protection and compensation as the worker under the general scheme, the only difference being that he gets his compensation from his employer instead of from a general fund. The board has met one objection to the individual liability system advanced by the men by arranging that the worker need not go to the employer to claim his rights. This is designed to protect the timid workman against relinquishment of his compensation or a part of it, especially in case of slight injury, owing to the fear that the pressing of his claim may prejudice his situation.

DEVELOPMENTS IN CINCINNATI.

The Rapid Transit Commission of Cincinnati has been asked by the Central Avenue Improvement Association to have the subway, necessary to the proposed rapid transit road, run down Central Avenue instead of Plum Street, no matter which of the four schemes under consideration may be adopted.

On Feb. 5 the People's Power League filed a petition with the city auditor, with 10,632 signatures, asking that a referendum vote on the franchise granted the Cincinnati, Newport & Covington Street Railway be taken at the regular election in November. The auditor has asked the city solicitor's opinion as to whether two elections will be necessary, one at the regular date in the fall, in compliance with this petition, and a special election on March 9, as asked in a petition filed by the business men of the city previously. The latter contained 30,000 names. While City Solicitor Schoenle had given no opinion early in the week, it is believed that the special election will be held. This company has informed the city that it will use some other streets than those designated in its franchise, if its plan should interfere with the rapid transit road that is now under consideration.

I. C. C. ACCIDENT BULLETIN FOR YEAR

The Interstate Commerce Commission has issued accident bulletin No. 52, covering the three months ended June 30, 1914, and the year ended June 30, 1914. The table of collisions and derailments on electric railways for the year contained in the bulletin follows:

No.	Classes	Number	Number of Persons Killed	Number of Persons Injured	Damage to Road and Equipment and Cost of Clearing Wrecks
	Collisions:				
1	Rear	69	18	675	$24,793
2	Butting	32	4	143	51,906
4	Miscellaneous	53	1	208	17,473
	Total	154	23	1,026	$94,172
	Derailments due to:				
5	Defects of roadway	18	1	38	$11,032
6	Defects of equipment	16	..	37	8,033
7	Negligence of trainmen, signalmen, etc.	8	..	9	1,173
8.	Unforeseen obstruction of track, etc.	14	1	38	5,750
9	Malicious obstruction of track, etc.	3	..	7	395
10	Miscellaneous causes	19	2	134	11,003
	Total	78	4	263	$37,386
	Total collisions and derailments	232	27	1,289	$131,558
	Total for year:				
	1913	275	29	1,401	211,777
	1912	261	21	1,605	117,865
	1911	255	92	1,291	110,466

The summaries of casualties to persons on the electric railways for the years ended June 30, 1914, and 1913 follow:

No.	Item	1914 Killed	1914 Injured	1913 Killed	1913 Injured
	Passengers:				
1	In train accidents	18	1,182	10	1,252
2	Other causes	40	2,047	26	1,789
	Total	58	3,229	36	3,041
	Employees on duty:				
3	In train accidents	9	100	18	154
4	In coupling accidents	2	25	1	19
5	Overhead obstructions, etc.	2	28	6	34
6	Falling from cars, etc.	8	126	8	138
7	Other causes	25	289	17	203
	Total	46	568	50	548
	Total passengers and employees on duty	104	3,797	86	3,589
	Employees not on duty:				
8	In train accidents	..	16	..	5
9	In coupling accidents	..		..	
10	Overhead obstruction, etc.	..		..	
11	Falling from cars, etc.	1	13	1	19
12	Other causes	2	5	2	4
	Total	3	34	3	28
	Other persons not trespassing:				
13	In train accidents	1	4	1	8
14	Other causes	247	1,081	196	860
	Total	248	1,085	197	868
	Trespassers:				
15	In train accidents	..		..	
16	Other causes	168	139	117	123
	Total	168	139	117	123
	Total accidents involving train operation	523	5,005	403	4,608
17	Industrial accidents	28	1,053	19	798
	Grand total	551	6,108	422	5,406

CHICAGO TRACTION FUND FOR AUTO BUSES

According to an opinion handed down by the corporation counsel of Chicago, the City Council is at liberty to use the traction fund, which represents the city's share of the net earnings of the surface lines, for the purchase and operation of a municipal bus system. In brief the opinion states that the city may, upon the passage of an appropriate ordinance, use the traction fund to acquire these buses and other property necessary for the operation of the bus line. The city may also acquire and own a bus system and lease it to a corporation for operation. Before an ordinance for acquiring and conducting the system would be legal, however, it must

have the approval of the voters, and they must also approve the plan for operating the system. This opinion was based upon the fact that although the traction ordinances provide that the city traction fund shall be used for the purchase and construction of street railways, the Supreme Court held that subways come under this provision. Furthermore, it was claimed that the 1907 City Council had no right to bind the succeeding councils on the purpose for which the traction fund should be used, providing the city's contractual relations were not molested.

Ohio Legislation.—A bill has been introduced in the Legislature to require all interurban and street cars to be equipped with a particular style of air brake and a particular sander.

Utah Commission Bill Opposed.—The Evans bill to create a public utilities commission in Utah was opposed by the representatives of the railroads and the public utilities on Feb. 5 as being unfair and unduly burdensome. The hearing was continued by the Senate committee to Feb. 9.

Kansas City Enabling Act.—A bill has been introduced in the Legislature of Missouri authorizing Kansas City to put aside the percentage it receives under the new franchise granted the Metropolitan Street Railway until sufficient money has accumulated to purchase the system.

Transfer of Ferry Service Sought.—Mayor Malone, of Chelsea, Mass., will shortly confer with the Boston Chamber of Commerce on behalf of turning over the ferry service between Chelsea and Boston to the Boston Elevated Railway and Bay State Street Railway in case the consolidation of the two companies is approved by the Legislature.

Toledo Prize Awards.—In the contest for the best criticism of the first franchise draft prepared by Henry L. Doherty and his associates in the Toledo Railways & Light Company awards were announced on Feb. 2. Judge John A. Doyle received the first prize, $100; Orville S. Brumbach, second, $75; William C. Clark, third, $50, and S. P. Bowles, fourth, $25.

Recent New York Bills.—Among the bills introduced recently in the New York Legislature are the following: to amend the public service commissions law in relation to quotation of rates by common carries; to amend the railroad law in relation to the minimum number of employees to be employed in the operation of certain trains; to amend the railroad law in relation to the length of trains.

Extension Question in Toronto.—The suggestion of Mayor Church, of Toronto, Ont., that application be made to the Ontario Legislature for the passing of an act compelling the Toronto Railway and the Toronto Suburban Railway to extend their lines and improve their services and equipment forthwith was adopted by the Board of Control on Jan. 29. The matter was expected to come before the Council on Feb. 1.

Subway Report in Los Angeles.—The Council of Los Angeles, Cal., by a unanimous vote, has adopted a resolution instructing the Board of Public Utilities to make a careful study of the traffic situation between Temple Street on the north, Tenth Street on the south, Main Street on the east, Hill Street on the West, and submit a report showing the results of such investigations and estimates of cost covering the construction of a subway system.

Rehearing Denied in Mill-Tax Case.—The Supreme Court of Missouri has denied the application of the United Railways, St. Louis, Mo., for permission to file a motion for a rehearing in the mill-tax case. The case will be appealed to the Supreme Court of the United States. The company will contend in presenting the case to the United States Supreme Court that the Missouri Supreme Court misinterprets a former decision of the United States Supreme Court.

Important Question Before Ohio Commission.—Walter M. Schoenle, city solicitor of Cincinnati, and Lawrence Maxwell and Ellis G. Kinkead, attorneys for the company, requested the Public Utilities Commission of Ohio on Jan. 25 to state the extent to which the Cincinnati Traction Company will be allowed credit in its reproduction value for the money spent in paving between its tracks. The opinion of the commission is desired as a guide in the consideration of the questions that have come up with regard to the road.

Illinois Public Utilities Commission Closes First Year.—The State Public Utilities Commission of Illinois has closed its first year of work and reports receipts of $510,173 and expenditures of $180,000, including all salaries and the fitting up of offices in Springfield and Chicago. More than 3000 cases were considered during the year, and of approximately 500 formal cases heard eighteen appeals were taken from the decision of the commission. Nine of these appeals were heard in the circuit court of Sangamon County at Springfield and in no case was the decision of the commission reversed.

Bills Introduced in Maine.—Two workmen's compensation measures known respectively as the Swift bill and the Cole bill, have been introduced into the Legislature of Maine. A bill regarded as the most drastic bill by far presented at the present session has just made its appearance in the Senate. This measure would create the People's Water Rates & Power Commission. Under it all water powers now privately owned would be taken over by the commission, rented for the benefit of the State and the entire question of the control of water powers taken from the jurisdiction of the Public Utilities Commission.

Key Route Must Build Interlocker.—The Railroad Commission of California has rendered a decision in which it finds that the interlocking plant at Lowell Street and Stanford Avenue in the city of Oakland is inadequate and unsafe. This tower protects the tracks of the San Francisco-Oakland Terminal Railways, the Southern Pacific Company and the Atchison, Topeka & Santa Fé Railway. These carriers are directed to replace the present tower with a first-class, standard, interlocking plant within six months from the date of the commission's order. The first-named company will have to bear the greater portion of the expense.

Proposed Consolidation of Utilities and Tax Commissions.—There has been talk in Ohio, in connection with the Governor's program of economy, of consolidating the State Public Utilities and the State Tax Commissions. James Boyle and J. H. McGiffert have been nominated as members of the Tax Commission to succeed Frank E. Munn and Christian Pabst. Mr. Boyle served as private secretary of the late William McKinley when he was Governor and as consul to Liverpool during Mr. McKinley's administration as president. Mr. McGiffert was connected with the State Auditor's office under Walter D. Guilbert and E. M. Fullington and afterwards was transferred to the State Tax Commission in charge of the collection of the excise tax on corporations.

Los Angeles Railway Purchase Considered by City.—The City Council of Los Angeles, Cal., is considering what policy it shall follow in handling expiring street railway franchises. The acquisition of the street railways by the city under the charter provision whereby the city may issue bonds against a revenue-producing utility is being urged. At a recent executive conference of the Council, George A. Damon, associate of Bion J. Arnold, Chicago, who made the transportation study for the city several years ago, said that the city could take over the railways by paying a portion of the equity value of the railways, and issuing bonds against the railways themselves for the balance. The Council as a committee of the whole has referred the matter to the board of utilities.

Philadelphia Councils Desire Rapid Transit Details.—Councils, in both chambers, on Feb. 4, adopted a resolution requesting Transit Director A. Merritt Taylor to present to Councils, if possible by Feb. 18, a complete list and full description of the subway, elevated and surface lines contemplated to be constructed under his rapid transit improvement plans. Robert S. Dripps, reform floor leader in Common Council, declared that Mr. Taylor had made a full report to Councils on his plans last summer and that the resolution was aimed to prevent the people expressing their views at the proposed special election next month on the Taylor plans by vote at the polls on the $30,000,000 permanent loan for carrying on the work. Mr. Taylor said: "All the information required by the resolution has been worked out in detail and is on file in the Department of City Transit. I am very glad to have the opportunity of furnishing this information to the City Councils in the specific form requested, with every detail which is relevant thereto."

Financial and Corporate

MR. BYLLESBY ON BUSINESS

This Public Utility Operator Looks Forward to a Recurring Period of Reasonable Expansion of Utility Business

H. M. Byllesby, speaking in a recent interview particularly about electric light, power and gas properties, stated that these seem to be enjoying a greatly increased popular standing on account of the stability which they have shown during the last few years of legislative attacks and generally depressed business conditions.

In regard to the general business conditions, Mr. Byllesby said:

"From one end of the country to the other there is a growing confidence in a revival of general business, and there is no enterprise which responds more quickly to such a revival than the public utilities. The corollary naturally follows that with a revival in the activity of the utilities, a corresponding increase is immediately felt in the operation of the vast industries whose business is the manufacture of wire, pipe, structural material, electrical machinery, boilers and various adjuncts for utility operation.

"Within the last few years there has been a very pronounced curtailment of the development of all classes of utilities on account of a variety of reasons, principal among which have been the extreme difficulty of providing capital for their further development and the disinclination of the operators of such properties to engage in further development risks in the face of the drastic attitude of the public and regulatory bodies and the uncertain business conditions. Believing that both of these conditions have materially changed for the better within the last few months, however, I have reason to expect a recurring of reasonable expansion of the utility business."

MR. FARRELL SEES BUSINESS BOOM

Head of Steel Corporation Sees Unprecedented Opportunities at Hand in the United States

President Farrell of the United States Steel Corporation, in a recent address before the Engineers' Society of Western Pennsylvania, stated that the financial tide in the United States has turned and that the country now has before it a period of unprecedented prosperity. In his opinion, every day now records a marked improvement in the general situation.

Continuing Mr. Farrell said:

"Our foreign trade balance for January will approximate $150,000,000, a figure never before approached in our history. Eminent authorities have calculated that this may easily reach $1,000,000,000 for 1915. This is important, for the years of greatest prosperity have been when the balances were largely in our favor.

"We are furnishing Canada with capital and we have made a beginning in extending investment to South and Central America. Moreover, the United States is to-day the chief granary of Europe. The prices received should insure for our farming population and therefore for the general population an unprecedented measure of prosperity.

"The steel trade is improving and the outlook is encouraging. The lumber industry is showing similar results. Large orders from belligerents and neutrals in Europe are keeping various lines of industry quite busy. Building has been quiet, but investors are coming to realize that money can be saved by starting operations now, material being available at unusually attractive prices. There is evidence of increasing merchandise traffic on the railroads, of opportunity to earn more money to establish credit and make expenditures for materials and equipment—which all mean activity in manufacturing lines dependent upon railroads for orders."

Mr. Farrell, in closing his address, announced the resumption of new construction work by the United States Steel Corporation. He said that last year the company had suspended all operations of new construction in the Pittsburgh district, but as evidence of its faith in the immediate future it had decided to proceed with work at once in order that it might be prepared for greater things.

ANNUAL REPORTS

Cleveland Railway

The statement of income, profit and loss of the Cleveland (Ohio) Railway for the year ended Dec. 31, 1914, follows:

		Cents Per Car Mile
Based on Ordinance Allowances		
Operating revenues:		
Revenue from transportation	$7,610,592	
Revenue from operations other than transportation	81,751	
Total operating revenues	$7,692,343	23.80
Expense allowances:		
Maintenance allowance	$1,602,398	4.96
Operating expense allowance	3,910,934	12.10
Total expense allowances	$5,513,332	17.06
Operating income	$2,179,011	6.74
Non-operating income	43,334	0.13
Gross income	$2,222,345	6.87
Taxes	466,996	1.44
Net income	$1,755,349	5.43
Interest	1,702,259	5.27
Surplus	$53,090	0.16
Special allowances	180,000	.055
Deficit	$126,910	0.39
Based on Disbursements		
Operating revenues	$7,692,343	23.80
Actual expenses:		
Maintenance of way and structures	$1,158,683	3.58
Maintenance of equipment — except power plant	649,898	2.02
Maintenance of power plant	119,677	0.37
Power	728,227	2.25
Conducting transportation	2,406,999	7.45
Traffic	899	0.00
General and miscellaneous	815,113	2.52
Total maintenance and operating expenses	$5,879,676	18.19
Operating income	$1,812,667	5.61
Non-operating income	43,334	0.13
Gross income	$1,856,001	5.74
Taxes	466,996	1.44
Net income	$1,389,005	4.30
Interest	1,702,259	5.27
Deficit	$313,254	0.97
Obsolete equipment	120,000	0.37
Total deficit	$433,254	1.34

The increase in passenger revenue during the year, exclusive of transfers, amounted to $299,616 or 4.31 per cent, while the increase in passenger revenue, including transfers, was $532,336 or 7.66 per cent. Gross income increased $554,911 or 7.58 per cent. The increase in maintenance allowance was $99,267 or 6.6 per cent, and the increase of maintenance expenses was $235,427 or 13.91 per cent. The operating allowance increased $216,111 or 5.85 per cent, while the operating expenses increased $246,953 or 6.66 per cent. Taxes increased $32,323 or 7.3 per cent, and interest $130,688 or 8.31 per cent. The total increase in operating expenses, taxes and interest amounted to $409,965 or 7.18 per cent, and the increase in maintenance and operating expenses, taxes and interest was $645,392 or 8.72 per cent. The year showed the following increases in transportation statistics: Fares, 9,638,017 or 4.37 per cent; transfers, 5,056,031 or 5.77 per cent; rides, 14,349,271 or 4.61 per cent; ordinance car-miles, 1,965,425 or 6.52 per cent, and actual car-miles, 2,605,760 or 8.43 per cent.

The report states that the most important development during the year, in its effect upon the finances of the company, was the increase in the rate of fare. In July the net balance in the interest fund fell below $300,000 and on Sept. 1 the company began to retain the 1 cent charge per transfer instead of returning it. The effect of this on the passenger revenue was an increase of 8.97 per cent for September, 11.21 per cent for October, 16.06 per cent for November, and 9.07 per cent for December as compared to the corresponding months of 1913. The first eight months of 1914 showed an increase in passenger revenue of 5.84 per cent and the last four months an increase of 11.21 per cent, or an average for the twelve months of 7.66 per cent.

The receipts for transfers in the last four months amounted to $232,719. Omitting these transfer receipts, the report shows that the increase for the last four months dropped to 1.32 per cent, which was made up of increases as follows: September, 0.87 per cent; October, 1.24 per cent; November, 5.75 per cent and December, 0.42 per cent. The receipts for November, 1913, was less by about $40,000 than they would have been but for the great storm of that month. If this amount were added to this month's revenues to bring them up to normal, the increase in November, 1914, would be changed to a decrease. The last four months of the year would then show a decrease of 0.375 per cent instead of an increase of 1.32 per cent. The serious drop in earnings came in August. On the basis of actual earnings the passenger revenue for the first seven months increased 6.59 per cent and for the last five months 1.27 per cent. On the basis of the revised figures for November, 1913, the passenger revenue during the last five months decreased 0.07 per cent, giving an average of 3.71 per cent as compared to 4.31 per cent under the preceding calculation. The increase in the rate of fare, which was intended to make up the depletion in the interest fund, was therefore but little more than enough in the four months to take the place of the reduction in earnings in the last five months caused by the change in general business conditions.

The charges to expense during the year for repairs of the physical property and for such renewals as were properly chargeable to expense, amounted to $1,928,437 or 5.97 cents per revenue car mile. The total amount allowed for these purposes and for depreciation was $1,602,398. The expenditures, therefore, exceeded the ordinance allowance by $326,039, and the maintenance, renewal and depreciation reserve at the end of the year was over-expended to the extent of $490,687. During the ten months ended Dec. 31 the company deducted from gross receipts and credited to the reserve $120,000 for abandoned property, whose reproduction value is set at $705,348. The company is also charging gross receipts and crediting to the reserve $6,000 per month from March until $217,444 has been paid in, this sum being the amount of over-expenditures in the maintenance, depreciation, and renewal reserve on March 1, 1913.

The operating expenses for the year were 12.22 cents per car mile, or 0.12 cents in excess of the operating expense allowance. The report states that it may be necessary, therefore, to make an application to the City Council before the end of the ordinance year for at least a temporary increase in the allowance. It is stated that there was an increase in revenue car miles in the year as a whole, but that the service was reduced in August and figures for the last four months show a decrease of about 305,000 miles. If this reduction in service had not been made, the operating expense allowance would have been $37,000 greater, but the actual expenses would have been increased only about half of this amount. Furthermore, the earnings of the entire road per car mile were 23.32 cents, but the earnings of new crosstown lines varied from 10.09 cents to 20.75 cents and their total cost of operation, including maintenance, operating expenses, taxes and interest, was 25.27 cents. There was also an increase of expenditures in the accident department, due to causes beyond the control of the management, from 1.02 cents to 1.27 cents per car mile.

One hundred and sixty new cars were added to the company's rolling stock during the year, and sixty-nine cars were retired. On the basis of numbers only, the net increase in the year was 8 per cent. On Dec. 31 the company had 1373 revenue cars and 183 service cars. Its single track mileage was 344.746 miles. Betterment expenditures during the year amounted to $2,577,867.

The total number of stockholders of the company is 4262, with average holdings of thirty-nine shares. The stockholders residing in Ohio, 3813 or 89.5 per cent, own 88 per cent of the outstanding stock. Of these stockholders, 2979 with an average holding of sixty-six shares, reside in Cleveland and Cuyahoga County.

In March the stockholders were allowed to purchase additional capital stock to the amount of 10 per cent of their holdings. Of the $2,141,000 offered, $2,137,400 was so sold. In September an additional offering of $2,382,000 was made, of which $1,914,800 had been issued up to Jan. 20. On Dec. 31 the total amount of capital stock outstanding was $25,221,200.

KANSAS CITY REORGANIZATION PLAN

No Assessment on Stock Issues of Kansas City Railway & Light Company—New Bonds Proposed—$3,400,000 of Working Capital Needed

Chairman Dunham of the reorganization committee of the Kansas City Railway & Light Company, Kansas City, Mo., on Feb. 8 announced the details of the proposed plan of reorganization for the company. The $9,407,500 of preferred stock and $9,543,080 of common stock of the Kansas City Railway & Light Company outstanding in the hands of the public will remain undisturbed, and no assessments will be levied.

The secured indebtedness of the company, amounting to $28,700,000, is to be cared for in the following ways: To pay off $24,920,000 of overdue securities (including $10,200,000 of Kansas City Railway & Light Company first lien refunding mortgage 5's, $5,478,000 of Kansas City Railway & Light Company Series A and Series B 6 per cent notes, $7,242,000 of Metropolitan Street Railway consolidated mortgage 5's and $2,000,000 of Central Electric Railway first mortgage 5's), to provide for additions and to pay debts, there will be a new issue of twenty-five-year 5 per cent first mortgage bonds exclusively upon the street railway property of the Kansas City Railways, the successor to the Metropolitan Street Railway, and also an issue of new twenty-five-year 6 per cent first lien collateral mortgage notes of the Kansas City Railway & Light Company. The collateral for this second new issue will be the stock of both the street railway and the lighting properties. The electric light company will be left without a direct lien on its property, and will have power to mortgage it for future extensions, provided the stockholders under commission approval raise $150 for every $850 raised by bonds.

In changing the old overdue issues into these two new issues, the Metropolitan Street Railway consolidated mortgage 5's and the Kansas City Railway & Light Company first lien refunding mortgage 5's are to be exchangeable at 107 for the new Kansas City Railway bonds. Provision is made, however, that the Metropolitan bonds may be changed at par into a separate issue of three-year 5½ per cent notes of the Kansas City Railway & Light Company. The matured Series A and Series B notes of the Kansas City Railway & Light Company are to be exchanged at 105 for the new Kansas City Railway & Light Company first lien collateral mortgage 6 per cent notes. The $2,000,000 of Central Electric Railway first mortgage 5's are also to be exchanged for these first lien notes at 105.

Thus far all the outstanding issues except $680,000 of Corrigan Consolidated and East Side bonds and railway and light 5 per cent notes to banks, and except $3,100,000 of Kansas City Elevated Railway and Kansas City & Westport Belt Railway first mortgage bonds have been covered. The first named group will be paid in cash, while the bonds of the second group, maturing in 1922 and 1926, will be left lying on their respective properties. An amount of $3,410,000 of the new Kansas City Railways bonds, however, is set aside to acquire these unmatured bonds or obtain a clear title to the property securing them. Portions not so used are to be cancelled.

To insure the success of this reorganization plan it is necessary to raise working capital estimated at $3,400,000. For this purpose an arrangement has been made to underwrite at 85 $4,000,000 of an authorized issue of $15,000,000 of new twenty-five-year 6 per cent second lien Kansas City Railway & Light Company notes. The stockholders are offered the option of taking their proportionate share of these notes at the same figure. Chairman Dunham states that it is hoped to have the plan in operation by July 1. It must be approved by the Federal Court, the Mayor and City Counselor and the Public Service Commission.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.—The Public Service Commission for the Second District of New York has authorized an issue of $150,000 of eighteen-months 6 per cent notes and $43,400 of 6 per cent equipment trust certificates of the Auburn & Syracuse Electric Railroad. The notes are dated Feb. 1, 1915, and due on Aug. 1, 1916, and are to be sold at not less than 99½. The net proceeds, or $149,250, are to be applied toward the pay-

ment of outstanding notes payable and bills payable and also part of the company's $300,000 of notes heretofore authorized. The equipment trust certificates, issued in connection with the Guaranty Trust Company, New York, are to be accompanied by a cash payment of $10,580 and are to be paid in four installments with interest on the deferred payments at 6 per cent. The proceeds are to be used to purchase twelve new enclosed body electric passenger cars.

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—It is reported that J. A. Turner was on Jan. 26 appointed receiver of the Bryan & Central Texas Interurban Railroad. The appointment was made at Houston by the United States District Court on the application of A. C. Price, New York, trustee.

Columbus Railway, Power & Light Company, Columbus, Ohio.—The Ohio Public Utilities Commission has authorized the Columbus Railway, Power & Light Company to issue and deliver to the holders of a like amount of the preferred and common stocks of the Columbus Light & Power Company, an amount of $516,300 of the preferred stock, series A, and $210,500 of the preferred stock, series B, of the Columbus Railway, Power & Light Company, in full and final payment for the property of the Columbus Light, Heat & Power Company. These amounts constitute an amendment to the original order of consolidation of April 22, 1913, and show the basis for the purchase of the lighting and heating company, which was authorized by the stockholders of the railway company on Jan. 26, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 6.

Jersey Central Traction Company, Keyport, N. J.—The Board of Public Utility Commissioners of New Jersey has issued a certificate approving an issue of bonds to the amount of $1,754,000 by the Jersey Central Traction Company.

Lincoln Railway & Heating Company, Lincoln, Ill.—The Lincoln Railway & Heating Company has been granted a certificate of incorporation by the Secretary of State of Illinois. The company's capital stock is stated to be $15,000. The incorporators are J. R. Patton, John A. Hoblit and Frank S. Bevan. This company succeeds the Lincoln Railway & Light Company, which was sold at public auction on Jan. 14 to J. R. Patton, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 23.

New York State Railways, Rochester, N. Y. — Harris, Forbes & Company, New York, announce that practically all of the first consolidated mortgage fifty-year 4½ per cent gold bonds of the New York State Railways recently offered by this company and N. W. Harris & Company, Inc., Boston, and the Harris Trust & Savings Bank, Chicago, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 30 and Feb. 6, have already been sold.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Sacramento Valley Electric Company has leased its 12-mile line, connecting the town of Dixon with the Oakland, Antioch & Eastern Railway's tracks, to the latter company for a period of six months, with the privilege of then renewing the lease. The lessee plans to operate the Dixon line as a feeder for the main system. The Railway Commission of California has authorized the Oakland, Antioch & Eastern Railway to issue two notes in the sum of $58,000 to replace two other notes previously issued without the consent of the commission. The company is further granted authority to mortgage certain real estate in the city of Sacramento now used for terminal purposes, as security for the notes. The amount of these notes was by a misprint stated to be $68,000 in the ELECTRIC RAILWAY JOURNAL of Jan. 30.

Oklahoma Union Traction Company, Tulsa, Okla.—The Oklahoma Union Traction Company was sold on Feb. 5 at receiver's sale for $53,500 to A. J. Biddleson, who represented interests of the Colonial Trust Company. This company has 5 miles of track completed and 15 miles under construction.

Ottumwa Railway & Light Company, Ottumwa, Iowa.—H. M. Byllesby & Company reports that the gross earnings and miscellaneous income of the Ottumwa Railway & Light Company for the twelve months ended Dec. 31, 1914, were $324,928, as compared to $320,684 in 1913. The expenses and taxes in the two years amounted to $179,126 and $175,172, leaving net earnings of $145,802 and $145,512. The interest charges were $66,918 and $66,786, and the preferred stock dividends in each year $31,493, so that the balance was $47,390 for 1914 and $47,233 for 1913.

Peoria Railway, Peoria, Ill.—The Peoria Railway has been granted authority by the Illinois Pacific Utilities Commission to issue $570,000 of first and refunding mortgage bonds, dated June 20, 1906, and secured by a mortgage to the Chicago Title & Trust Company, trustee.

Public Service Railway, Newark, N. J.—The Board of Public Utilities Commissioners of New Jersey has granted permission to the Public Service Railway for the thirty-year extension at 5 per cent of the payment date for $100,000 of 5 per cent bonds of the North Hudson County Railway, due on Feb. 1.

Puget Sound Traction, Light & Traction Company, Seattle, Wash.—Lee, Higginson & Company, Boston, and Harris, Forbes & Company, New York, are offering at 100½ and interest, to yield about 5.85 per cent, an additional $557,000 of five-year 6 per cent mortgage gold bonds of the Puget Sound Traction, Light & Power Company. These bonds are dated Jan. 15, 1914, and are due on Feb. 1, 1919. This issue will make $8,067,000 outstanding of the $15,000,000 issue.

San Francisco (Cal.) Municipal Railways.—The December net earnings of the San Francisco municipal railway system amounted to $42,136, according to a report filed on Jan. 29 with the Board of Works. The city's cars are unharmed by the "jitney" busses, the report stated, as the new carriers have not come into competition with the city except for the short distance on Market street. The total receipts for December were $110,483, less United Railroad transfer reductions, and the expenses totaled $68,347.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The Railroad Commission of California has issued a supplemental order amending a previous decision in which the San Francisco-Oakland Terminal Railways was allowed to use $75,000 of a promissory note issue for the purchase of new cars, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 2. Under the terms of the new order, the company receives permission to expend $60,000 of this $75,000 in reimbursing its treasury for moneys expended from income, provided after such reimbursement the money is used for the payment of taxes falling due on Feb. 1, 1915.

Seattle, Renton & Southern Railway, Seattle, Wash.—In a recent decision holding the Illinois law declaring interest rates higher than 7 per cent to usury applied, Judge A. W. Frater of the King County Superior Court awarded Peabody, Houghtaling & Company, Chicago, only $270,000 of its $300,000 claim against the Seattle, Renton & Southern Railway on collateral trust notes of this electric line held by the banking firm. The amount allowed was the principal of the notes, the court holding that $30,000 of interest and discount, amounting to 8 per cent, was invalid because in excess of the interest allowed by Illinois law. Judge Frater, however, decided that a bond issue of $125,000 made by the railway, bought by the banking house and resold to small investors, was valid, inasmuch as the combined interest and discount did not exceed 6.8 per cent.

Southern Pacific Company, San Francisco, Cal.—According to a statement issued in the West, the Southern Pacific Company is preparing to take over various lines which it owns in Oregon and Washington. These include the electrically-operated Portland, Eugene & Eastern Railway. The statement says that the Southern Pacific Company owns the capital stocks of these companies, and their purchase is merely in accordance with the stock ownership. It is largely a bookkeeping matter and does not affect the public interest.

Southern Public Utilities Company, Charlotte, N. C.—The Southern Public Utilities Company has sold $2,600,000 of first and refunding mortgage 5 per cent gold bonds, due on July 1, 1943, to William Morris Imbrie & Company. This banking house has been appointed the fiscal agent of the company. The Southern Public Utilities Company owns and operates various electric power and lighting plants, gas plants and water works in the Piedmont section of North

and South Carolina. It also owns the property of the former Winston-Salem Railway & Electric Company.

United Traction Company, Pittsburgh, Pa.—No action has been taken upon the declaration of a dividend on the preferred stock of the United Traction Company, and the committee representing the preferred stockholders has called for deposits with the Philadelphia Trust, State Deposit & Insurance Company. Previous references to the dividend situation with this company were made in the ELECTRIC RAILWAY JOURNAL of Jan. 9 and Jan. 16.

Waverly, Sayre & Athens Traction Company, Waverly, N. Y.—A bill has been filed in the New York State Senate to validate the consolidation of the Susquehanna Valley Electric Traction Company, a New York State railway corporation, with the Waverly, Sayre & Athens Electric Traction Company, a Pennsylvania railway corporation, by which the Waverly, Sayre & Athens Traction Company was formed in 1894. The bill requires the certification of the Public Service Commission for the Second District of New York that the consolidation was made with the consent of the holders of more than two-thirds of the capital stock of each of the constituent companies and that all of the stockholders have acquiesced therein.

West Jersey & Seashore Railroad, Camden, N. J.—The stockholders of the West Jersey & Seashore Railroad voted on Feb. 4 to increase the common capital stock of the company by $3,000,000 and to execute a mortgage to secure not to exceed $6,000,000 of general and refunding bonds. Preliminary mention of these changes was made in the ELECTRIC RAILWAY JOURNAL on Jan. 2.

DIVIDENDS DECLARED

Central Arkansas Railway & Light Corporation, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Connecticut Valley Street Railway, Greenfield, Mass., quarterly, three-fourths of 1 per cent, common.

Detroit (Mich.) United Railway, quarterly, 1½ per cent.

Massachusetts Consolidated Railways, Greenfield, Mass., quarterly, 1⅜ per cent, preferred.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1½ per cent, first preferred; quarterly, 1½ per cent, original preferred.

Philadelphia Company, Pittsburgh, Pa., 2½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Dec.,	'14	$76,639	*$67,046	$9,593	$17,385	††$7,697
1 "	"	'13	76,164	*71,253	4,911	15,523	††10,528
6 "	"	'14	524,025	*466,938	57,087	103,306	††45,304
6 "	"	'13	541,338	*450,954	90,384	90,881	††369

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m.,	Dec.,	14	$630,642	*$446,564	$184,078	$97,462	‡$108,479
1 "	"	'13	631,963	*472,854	159,109	88,374	‡93,076
6 "	"	'14	4,192,386	*3,097,200	1,095,186	589,707	‡635,637
6 "	"	'13	4,282,333	*3,113,432	1,168,902	537,153	‡763,728

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m.,	Dec.,	'14	$24,466	*$23,590	$876	$7,876	††$6,980
1 "	"	'13	24,879	*23,759	1,120	7,726	††6,580
6 "	"	'14	214,808	*161,924	52,884	47,254	††5,902
6 "	"	'13	210,133	*155,594	54,538	46,092	††8,733

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m.,	Dec.,	'14	$38,043	*$45,618	†$7,575	$6,878	††$14,383
1 "	"	'13	34,173	*47,705	†13,532	4,976	††18,073
6 "	"	'14	225,116	*261,352	†36,236	36,886	††72,386
6 "	"	'13	205,185	*296,005	†90,820	31,550	††119,763

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m.,	Dec.,	'14	$411,509	*$314,187	$97,323	$117,308	††$18,337
1 "	"	'13	424,554	*327,952	96,603	107,589	††10,255
6 "	"	'14	2,788,017	*2,038,480	749,537	709,108	‡78,440
6 "	"	'13	2,833,670	*2,021,454	812,217	638,467	‡235,365

WESTCHESTER STREET RAILWAY, WHITE PLAINS, N. Y.

1m.,	Dec.,	'14	$18,421	*$21,922	$3,501	$1,312	††$4,807
1 "	"	'13	19,334	*20,154	821	1,137	††1,944
6 "	"	'14	141,806	*138,562	3,244	7,537	††4,219
6 "	"	'13	137,008	*128,466	8,543	6,417	††2,273

*Includes taxes. †Deficit. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Failure of Original Los Angeles Company—Jitney Idea Still Spreading—Notes Regarding New Regulatory Measures and Services Discontinued

A weird series of developments presents itself for record this week in connection with the "jitney." That the theory of the small profit and the quick turn-over in connection with the large bus has been carried to excess in one case at least is instanced by the news from Los Angeles that the Pacific Motor Coach Company of that city has filed a voluntary petition in bankruptcy in the United States Court. Insolvency proceedings had been previously instituted. The schedule of assets and liabilities shows the total indebtedness of the short-lived corporation amounts to $86,788. This includes a claim for thirty-three double-deck motor buses and one 2-ton fuel wagon. An aggregate of $1,729 is due employees for wages. The assets of the company are scheduled at $3,026. This company is not to be confused with any of the "jitney" bus associations, and was, in fact, hastened into bankruptcy by the diversion of such traffic as it at first enjoyed to the more speedy "jitney."

The idea of the "jitney" is still spreading. Two of the most important cities to be invaded are Toledo and Louisville. On Feb. 2 "jitney" service was started in Toledo, in competition with the Cherry Street line of the Toledo Railways & Light Company. In an address before the Toledo Automobile Association on the day the bus was started, F. R. Coates, president of the Toledo Railways & Light Company, said that the operation of the "jitney" will teach the people that a ride is worth 5 cents and in that way benefit the local railway.

In the case of Louisville, a charter has been filed in the county court there by the Nickel Automobile Company, with an authorized capital of $10,000. The incorporators announce that they will have lines of specially designed motor buses, each capable of hauling ten or fifteen passengers, and that they will ply between residence districts and the business section. Close on the heels of this project comes the announcement that other similar companies are in process of formation. William P. McDonough, attorney and secretary of the Louisville Retail Grocers' Association; Louis C. Heck, Jr., attorney; Stephen S. Jones, attorney, and William A. Baker, real estate man, are incorporators of the first company. J. S. Roberts, formerly with the Overland Automobile Agency, is promoting another company, while R. M. Cunningham, a lumberman with offices in the Inter-Southern Building, Louisville, is interested in organizing a third venture. It is stated the first of the Nickel Company's vehicles will be put on the streets some time in March, while it is declared by promoters of other venture that they will begin service immeditely. Officials of the Louisville Railway have declined to discuss the development.

H. M. Byllesby & Company, Chicago, Ill., report that two days' operation of "jitney" buses at Fort Smith convinced an auto-livery concern of that city that such competition with the street cars would not be profitable and the buses have been discontinued. The "jitney" line was started on the principal traffic artery of the city, and a ten-minute service with 5-cent fare was announced to the public in newspaper advertisements.

It is reported from Phoenix, Ariz., that the twelve cars which were started there in "jitney" service have been ordered to suspend operations by the Mayor. The service was installed in December. The city asked a license of $60 a year from the operators of the service and a $2,000 bond on each car. The owners of the service were censured severely by the city officials for allowing the passengers to ride on the steps of the cars and were finally forced to suspend.

On Feb. 2 the Board of Commissioners of Oklahoma City passed an ordinance regulating the "jitneys," and on the same day the Mayor signed the measure. This measure provides among other thing that all vehicles called "jitneys" must file an application with the city clerk stating the type of car, horse power, factory number, seating capacity, name of chauffeur, terminals, hours of operation, file a bond of

$10,000, pay an annual fee of $50 for each eight-passenger vehicle, $75 for each vehicle seating more than eight passengers, and $150 for each seating more than twelve passengers. Specifications are set out for signs to be carried and speed limits are fixed. It is made unlawful for "jitneys" to operate longitudinally upon any street occupied by a street car line, except that within the fire limits the vehicles may operate for not more than two blocks in one direction along such streets where necessary in crossing such fire limits.

The "jitney" did not make any large inroads on the receipts of the Oklahoma Railway. On Feb. 5 they were still plying their service, however, but there was a marked falling off in the number of vehicles running. At no time does it seem that they made anything like their expenses.

An ordinance is pending in Spokane to require "jitney" operators to file a bond of $5,000 and in addition pay an annual tax ranging from $25 to $100 a year.

The ordinance enacted by the City Commissioners of Denver to regulate the "jitney" was passed by a vote of four to one. An emergency clause was attached which made it effective immediately without having to wait the usual thirty days. The ordinance provides in short that it shall be unlawful to operate an automobile or other vehicle for hire without first securing a franchise and that violations of the ordinance shall be punishable by a fine of not less than $100 nor more than $300 or by imprisonment for not more than ninety days, or both. Every trip is to constitute a separate offense.

On Jan. 29 the City Council of Corpus Christi, Tex., took prompt measures to regulate the operation of "jitney" cars, when under the emergency clause an ordinance was passed requiring that any person, firm or corporation operating a "jitney" line must first secure a franchise from the city. In addition the ordinance provides that the applicant shall also furnish to the city a bond in a sufficient amount to guarantee the payment of any claims that arise as a result of damages, and that "any person injured by a 'jitney' car may sue the bondsmen."

In regard to the effort to regulate the "jitney" in Birmingham the *Herald* of that city said recently: "Disagreement among the members of the city commission over the provisions of the proposed ordinance to regulate the 'jitney' auto lines of the city has temporarily at least held up the new law, and in all probability has killed it. The proposed ordinance provided for a $2000 indemnity bond to be placed on each company operating cars and a license to be charged for each car in operation of probably $15 or $20. A very authentic report was to the effect that counsel for the Birmingham Railway, Light & Power Company has prepared an ordinance for the regulation of the 'jitney' autos, but which was not accepted by the commission because it was in some ways too drastic."

The City Council of Portland, Ore., has authorized Commissioner Daly to proceed at once with the formulation of legislation to govern the operation of "jitney" buses in that city. Mr. Daly hopes to report by Feb. 15.

Two hundred thousand little "missionaries" are to be sent out by the San Antonio (Tex.) Traction Company in the interest of public patronage of the street railway. The "missionaries" are in the form of "stickers" printed in blue, yellow, green and red, with this caption: "The Traction Company Has Helped Build San Antonio—Use the Street Cars." A picture of one of the modern steel cars operated by the company, as a background for a small mule car of the type used when the public carrier service first was established, is shown on the stamps. Printed under the drawing is: "1881-1915."

Automobile Topics seems to see the hand of the Standard Oil behind the "jitney" development. That paper says: "One of the most extensive fields of influence that the automobile industry has yet encountered lies in the 'jitney' bus. No less than a revolution has been effected in the used car market; the Standard Oil Company, seeing large increases in gasoline sales, is throwing its influence in favor of the movement; the leading tire companies are contemplating the strongest possible support for the promoters and operators of 'jitney' lines; and traction interests are concerned lest the values of their street railroad securities be impaired by traffic losses occasioned by the new competitors."

The Dallas *Dispatch*, Dallas, Tex., is offering prizes of $2 for best jingles about the "jitney." Here are a few of the gems published by that paper:

Hush, little Ford,
Don't you cry,
You will be a "jitney"
Bye and bye.

"Jitney" means a nickel,
A nickel means a ride,
If the "jitney" hadn't come along,
I suppose I would 'a' died.

If the "jitneys" jar and jingle like
The "jitney" jingles jar,
You can't blame a single human for
Preferring the trolley car.

The Fort Worth *Telegram* has also gone in for "jitney" jingles. There appeared in that paper recently the following:

Oh you "jitney"!
You give me a pain;
I rode in you once,
But never again.

If a street car meets a "jitney"
Coming down the lane,
And the street car hits the "jitney,"
I wonder who's to blame.

The trolleys are bad,
The "jitneys" are worse;
I always walk,
Safety first.

ATLANTA SERVICE DECISION

Synopsis of Georgia Railroad Commission's Decision Deals Interestingly with Seating Capacity

The Georgia Railway & Power Company, Atlanta, Ga., asked the Georgia Railroad Commission recently for authority to discontinue certain tripper or extra cars among the number operated in its system during rush hours, its position being that traffic had fallen off on the lines involved to an extent justifying the withdrawal of services not needed. The commission's decision, referred to very briefly in the ELECTRIC RAILWAY JOURNAL of Feb. 6, was against the company in all but three counts and was partially favorable in some four others. The synopsis of the decision of the commission contains one or two interesting points, particularly that which the commission makes as to the number of passengers above seating capacity that are allowable under abnormal conditions at rush hours. The commission said in part:

"While it is reasonable and wholly probable that during December, 1914, there was a smaller volume of traffic than during rush hours in 1913, the commission is of the opinion, from many considerations, that this decrease has been relatively smaller than in non-rush hours. Granting, however, that the rush-hour traffic is reduced under 1913, the commission is not inclined to agree with the assumption that the facilities supplied during these periods in 1913 were entirely adequate on every route. On some routes we feel sure they were not, and in making this statement the commission does not base it upon the contention that every passenger on every car operated should be furnished a seat. This contention may be sound in theory. Under street car traffic conditions as they exist daily, such a theory is frequently impossible of actual operation.

"In our opinion it is the duty of the common carrier to provide seats, that is, reasonable accommodations, in its cars for such patrons as desire them, in so far as they can reasonably anticipate and measure the volume of traffic which will offer. Experience shows that there is, with fair regularity, an estimable volume of traffic during certain hours of the day. This should be provided for. But this

does not mean that if an average of forty passengers customarily board a given schedule car on a certain route upon which is operated a forty-seat car, the car is then loaded to its reasonable capacity, and that when forty-one passengers begin to ride additional facilities must be provided.

"Careful observation has shown that an appreciable percentage of regular street car patrons prefer riding on the platforms to occupying seats inside the cars. These are styled 'voluntary standees.' Again, it must be borne in mind that city street car transportation is generally for comparatively short distances. A given route we will say is 5 miles long; cars are operated regularly the entire distance of the route. At an ascertained peak point, where the load is always heaviest, a forty-seat car will customarily have on board, say, forty-eight passengers. This maximum was only reached one block back. At the next block forward the car begins to discharge its load, and within two or three blocks the load is again below the seating capacity, no one having stood for a longer distance than three or four blocks or for a longer time than five or ten minutes. This particular schedule may have been—and observation demonstrates this—the only one at all overloaded during the whole day. Conditions frequently arise in street car traffic when it is impossible to avoid overloading for short distances or for short periods of time.

"Taking into consideration such conditions some commissions have held that facilities are fairly reasonable where the peak point loads do not exceed 30 per cent of the seating capacity offered for a continuous period of thirty or forty minutes. In our opinion, an allowance of 30 per cent over the seating capacity for standees, whether voluntary or involuntary, is too large. We are rather inclined to allow only 20 per cent on this account, to be extended not longer than thirty minutes with schedules operated or not exceeding ten-minute headway. It would not be reasonable to apply this rule to only one day's travel, or even a week's. The congestion should extend over such a reasonable period as would show that it is regular and not spasmodic; that it is permanent in nature and not due to temporary conditions. It would be unreasonable to require a carrier to operate sufficient cars to provide a seat for every passenger on every schedule or every day of every year and for every distance. Moreover, it is impossible even if the public would render the absolutely necessary co-operation in distributing the loads as between the cars offering.

"We have deemed it advisable to submit the foregoing general observations in order that the public may be reminded that the carrier is only required by law to supply reasonably adequate and comfortable facilities. It is the province of the commission to compel this reasonably adequate and efficient service. If at any time or upon any route there are shown to be facilities and service in excess of the reasonable needs of the public, it is just as much our duty to allow a reasonable reduction of this excess as to order more cars when service is shown to be inadequate. In the pending application our conclusions and action are based upon such facts as we have found to exist."

SAN FRANCISCO EXAMINATION RESULTS

Instructing Ninety New Crews in Twenty Days on San Francisco Municipal Line

When the Panama-Pacific Exposition opens on Feb. 20, the Municipal Railways of San Francisco plans to add ninety new cars to the number now in service, and the motormen and conductors who will be employed were selected from the Civil Service Commission eligible lists in time to allow twenty days for instruction, as most of the new men are without experience. The Civil Service Commission, working in conjunction with Thomas A. Cashin, superintendent of the Municipal Railway, some months ago planned the general nature of the examination and results have been highly satisfactory, it is now reported. The examination consisted of two parts, physical and written, and applicants who failed to pass in the first were not allowed to take the second. The physical tests were considered rather severe, and although about 3000 men made applications only 711 took the written part of the examination for motormen, and 798 the written examination for conductors. Of these, 554 passed the motormen's examination and 633 the conductors' examination. Those who passed successfully were then listed in the order of the written examination percentage made, and the first ninety men in each of the two lists were employed.

New Freight Service.—The Pacific Electric Railway, Los Angeles, Cal., has begun a freight service between San Bernardino, Los Angeles and way stations.

Increase in Fare.—The Cumberland & Westernport Electric Railway, Cumberland, Md., has increased the price of books of one hundred tickets good over its lines from $4 to $4.50. The cash fare remains at 5 cents in each zone.

Fare Hearing Continued.—The hearing in connection with the fare complaint against the Public Service Railway, Newark, N. J., by representatives of Gloucester City, Woodbury and other towns will be continued before the Board of Public Utilities Commissioners on Feb. 23 at Trenton.

Hitching Sleds to One-Man Cars.—Instructions have been issued to the city police force of Regina, Saskatchewan, to take vigorous measures to suppress the practice indulged in by youths of the city of tying their sleds to the cars of the Regina Municipal Railway. One-man cars are operated.

Rounding Up Deaf Teamsters.—The Metropolitan Street Railway, Kansas City, Mo., has this order posted in the carhouses: "Conductors and motormen will obtain the names of all wagons which remain on the tracks after sounding the gongs and report the same to the division superintendents."

Ventilation in Louisville.—Instructions to conductors of the Louisville (Ky.) Railway provide that at all times two of the ventilators in the cars shall be kept open. This is the answer of the company to the agitation of the question of street car ventilation in which certain Louisville newspapers and the city health authorities have been indulging.

I. T. S. Reduction in Fare.—The Illinois Traction System, Peoria, Ill., has announced reduced passenger tariffs between Bloomington, Peoria and St. Louis, claiming a differential over steam lines. The old round-trip rate from Bloomington to St. Louis was $5.30; the new rate is $5; the old rate, round trip, Peoria to St. Louis, $5.50; new rate, $5.30; old rate, round trip, Springfield to St. Louis, $3.10; new, $2.80.

E. R. Kelsey Wins in Membership Contest.—A membership contest for the Young Men's Christian Association at Toledo, Ohio, ended on Jan. 28. Two teams were organized and christened the "Electrics" and the "Steams." E. R. Kelsey, publicity manager of the Toledo Railways & Light Company, captained the "Electrics" and Hugh Campbell, the "Steams." The object was to increase the membership by at least 300. Mr. Kelsey's team won with 185, while Mr. Campbell's team secured 130.

Hearing Regarding Trailers.—The Public Utilities Commission of the District of Columbia will hold a formal hearing on Feb. 16 to consider the application of the Capital Traction Company with respect to Section 13 of order No. 21 regulating the operation and equipment of cars in the District of Columbia. Section 13 provides that no trail car shall be operated for the purpose of carrying passengers unless a separate conductor or an employee acting as such is provided for each car of the train.

New Fare on Schenectady Railway.—Local round-trip tickets good until used for transportation between Stop 19, or any stop between Stop 19 and Stop 14½, inclusive, and Schenectady, or for transportation between Stop 19, or any stop between Stop 19 and Stop 22½, inclusive, and Albany, will be sold in the Schenectady and Albany terminals and at a convenient place in the vicinity of Stop 19 at 25 cents a ticket. This is a new fare established under order of the Public Service Commission in cases Nos. 4545 and 4587 and will go into effect on March 1, 1915.

Action on "Jim Crow" Bill Postponed.—The House by a vote of 168 to 107 has decided not to take up, for the present, the bill introduced by Representative Clark, of Florida, providing for the operation of "Jim Crow" cars on the electric railways in the District of Columbia. The Clark bill was introduced in the House on April 7, 1913. After lying dormant for almost two years, it was suddenly revived on Feb. 2, 1915, when it was ordered reported to the House. It is possible for this legislation to come up on Feb. 22, or

by a special agreement among the House leaders on some other day.

Accident on New York Elevated.—Nine persons were injured in an accident on the Manhattan Elevated Railway, at 8:37 a. m. on Feb. 6, when a south-bound Ninth Avenue local train crashed into the rear car of a local-express that was halted at the Fiftieth Street station. After the collision a short circuit started a fire in the wrecked rear car of the local express and the first car of the local, which had telescoped each other by the force of the collision. The immediate effect of the accident was to suspend all traffic on the Sixth Avenue elevated line, the trains of which turn into Ninth Avenue through Fifty-third Street.

Brooklyn Transfer Order.—The Public Service Commission for the First District of New York has rescinded an order adopted in November last and adopted three new orders, requiring the Van Brunt Street & Erie Basin Railroad to exchange transfers with the intersecting lines of the Coney Island & Brooklyn Railroad, the Brooklyn Heights Railroad and the Nassau Electric Railroad at Hamilton Avenue. The order directs the companies to agree between them as to the portion of the 5-cent fare to which each shall be entitled by Feb. 10, 1915, and to report to the commission upon Feb. 11 whether such an agreement has been reached, so that the commission may apportion the joint rate if the companies fail to agree.

Motorman Not Entitled to Engineer's Pay.—In the hearing before the Railroad Board of Arbitration, which is considering the demand of engineers and firemen of the Western district for an increase in wages, R. E. Hewitt, general foreman of electric car shops, Southern Pacific Company, West Alameda, Cal., stated that motormen on electrified steam roads are not entitled to the wages of the locomotive engineer. Mr. Hewitt is quoted as saying: "The only thing the motorman has to do is to lift his kit of tools into the cab and to see that he has a supply of fuses. Everything has been made ready for him before the motor leaves the shop. The employees have dubbed the motor 'the dead man's outfit,' and the motormen certainly are not entitled to an engineer's wages."

Ambulance Chaser Fined at Boston.—The first case to be brought at Boston, Mass., under the so-called ambulance-chaser law (Chap. 432) of 1914 has resulted in the conviction of Harry Noonan and the imposition of a fine of $100 for soliciting a claim in a damage case against the Boston Elevated Railway. The act provides penalties for disbarred attorneys and also includes in its prohibition any person not having been admitted to the bar who represents himself as having authority in behalf of persons having claims for damages to procure settlements for such claims, or whoever, not being an attorney, solicits either for himself or for another the management and control of such claims. The maximum penalty for the first offense is a fine of $100 or six months' imprisonment and for each subsequent offense a fine of $500 or imprisonment of one year.

Accident Figures for Detroit.—During 1914 a total of 16,331 accident reports were filed with the Detroit (Mich.) United Railway as against 17,938 the year before, a reduciton of 9 per cent. The records of the company show that while 4142 cars were in collision in 1913 this number was cut down to 2343 in 1914, a reduction of 43 per cent. There was a decrease of 11 per cent in derailment of cars, an increase from seventy-one to eighty reports on running into open switch points, while there was a decrease of 47 per cent in running over street and steam railroad crossings. In 1913 there were 2595 reports on passengers hurt in boarding or alighting from cars, while last year this was cut to 2143, a reduction of 17 per cent. In reports on falling from cars, mostly moving, there was a reduction from 304 in 1913 to 191 in 1914, or 37 per cent. There was an increase from 248 to 309 in reports of passengers hurt while within the body of the car. In 1913 there were 3210 automobile collisions with cars on the Detroit United Lines, mostly within the one-fare zone. In 1914 this class of accident reports increased to 4072. This is an increase of 27 per cent, with more than eleven automobiles struck every day. The worst month of all was December, when 491 automobiles were struck, an average of sixteen a day. The company says: "Let us have some 'safety first' operation among the automobile drivers."

Personal Mention

Mr. C. E. Brown has succeeded Mr. J. H. Hornung as manager of the San Francisco, Napa & Calistoga Railway and will make his headquarters at Napa, Cal.

Mr. H. E. Blain has been appointed operating manager of the Metropolitan District Railway, London Electric Railway, City & South London Railway and Central London Railway, London, England.

Mr. Frederick L. Siddons has been appointed an associate justice of the Supreme Court of the District of Columbia and has been succeeded as a member of the Public Utilities Commission by Mr. Louis Brownlow.

Mr. J. M. Nelson has resigned as chief engineer of the power station of the Houghton County Traction Company, Houghton, Mich., to become connected with the Standard Oil Company as a traveling engineer.

Mr. Z. E. Knapp has been appointed manager of maintenance and construction of the Metropolitan District Railway, London Electric Railway, City & South London Railway and the Central London Railway, London, England.

Mr. J. P. Thomas has been appointed general superintendent to the London (England) General Omnibus Company, Ltd., and in this capacity will have charge of all the work of operation, under the general control of Mr. H. E. Blain, operating manager.

Mr. W. E. Mandelick, in addition to his office as secretary to the Metropolitan District Railway, London Electric Railway Company, City & South London Railway and the Central London Railway, London, England, has been appointed business manager of the companies.

Mr. W. E. Blake, in addition to his position as superintendent of the line to the District Railway, has been appointed superintendent of the line to the London Electric Railway, City & South London Railway and Central London Railways, in place of Mr. J. P. Thomas, who has resigned from these companies to become general superintendent of the London General Omnibus Company, Ltd.

OBITUARY

G. Benz, director of the Gesellschaft für den Bau von Untergrundbahnen (Underground Railways Construction Company, Berlin, Germany), is reported killed in battle. Mr. Benz had previously received the iron cross for valor.

James F. McElroy, president of the Consolidated Car Heating Company, Albany, N. Y., died at Laconia, N. H., on Feb. 10. Mr. McElroy was born in Greenfield, Ohio, Nov. 25, 1852, and was graduated from Dartmouth College in 1876. For four years following Mr. McElroy was the principal teacher of the Indianapolis Institution for the Blind, and then for seven years was superintendent of the Michigan Institution for the Blind. In 1887 he organized the McElroy Car Heating Company. Two years later it was combined with the Sewall Car Heating Company.

Norman B. Ream, capitalist, died in New York on Feb. 9. Mr. Ream was born in Somerset County, Pa., on Nov. 15, 1844. At the age of fourteen he became a teacher, and in 1861 enlisted as a private in the Union army. He was wounded in a battle near Savannah and returned from the war a commissioned officer. He then clerked for awhile in Pennsylvania, but in 1866 opened a general store in Princeton, Ill. The following year he moved to Osceola, Ia., increasing the line of goods handled. In 1871 he moved to Chicago and engaged in the commission business. He prospered immensely and was a member of the famous big four which included N. S. Jones, John Cudahy and Sidney A. Kent. Mr. Ream had made his headquarters in New York for many years. He was connected with many corporations as an officer or director, among them the following: Baltimore & Ohio Railroad, Brooklyn Heights Railroad, Brooklyn Rapid Transit Company, Chicago & Erie Railroad, Chicago & Alton Railroad, Chicago, Burlington & Quincy Railroad, Erie Railroad, International Harvester Company, National Biscuit Company, New York, Susquehanna & Western Railroad, Pennsylvania Coal Company, Pullman Company, Seaboard Air Line Railway, United States Steel Corporation.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Black Mountain & Eastern Railroad, Combs, Ark.**—Chartered in Arkansas to build a 20-mile interurban railway between Combs and Cass. Capital stock, $250,000. Edward C. Jeter, Fayetteville, Ark., director.

***New Britain (Conn.) Street Railway.**—Application for a charter has been made by this company in Connecticut to build an electric railway from the corner of Myrtle Street and Main Street, in New Britain, to connect with the existing electric line, westerly along Myrtle Street to Grove Street, to Broad Street, Washington Street, Farmington Avenue to Stanley Street and on the Hartford road to connect with the existing line at Elmwood. Another line would begin at Grove Street and extend along Plainville road to the center in Plainville. A third line would extend westerly from Main and Broad Streets to Washington Street and a fourth would extend from North Burritt Street to Farmington Avenue and Commonwealth Avenue where it would connect with the line first mentioned. Capital stock, $50,000 to be increased to $500,000. Incorporators: Mayor George A. Quigley, George M. Landers, Joseph M. Halloran, Edward O. Kilbourne, William J. Farley, George Glover, George P. Spear and Mortimer H. Camp.

***Lincoln Railway & Heating Company, Lincoln, Ill.**—Incorporated in Illinois, presumably as the successor to the Lincoln Railway & Light Company, the property of which was sold under foreclosure recently, and to build electric railways in Lincoln. Capital stock, $15,000. Incorporators: J. R. Patton, John A. Hoblit and Frank S. Bevan.

***Marietta-Parkersburg Railway, Marietta, Ohio.**—Chartered in Ohio to build an interurban railway between Marietta and Parkersburg. Capital stock, $10,000. Incorporators: H. H. Archer, E. Clark, Jr., and John Kaiser.

FRANCHISES

Phoenix, Ariz.—The Phoenix Railway has received a franchise from the Council for an extension along Monroe Street between First Street and Second Avenue in Phoenix.

Los Angeles, Cal.—The Los Angeles Railway has received an extension of time on its franchise in which to complete the work of reconstruction of tracks and paving certain sections of its lines in Los Angeles.

Los Angeles, Cal.—The public utilities committee of the City Council decided recently to recommend the granting of a franchise for an incline railway in Griffith Park, for which Colonel Lewis Ginger has made application. The Board of Public Utilities is to outline the route and the mode of operation, and the city attorney will then prepare the notice of sale. Colonel Ginger states that he is ready to begin construction as soon as the legal phases of the subject are fulfilled and he hopes to have the line in operation within six months after it starts. [E. R. J., Dec. 26, '14.]

Mill Valley, Cal.—The Railroad Commission has denied the application of the Marin County Electric Railways for permission to proceed with the construction of 1 mile of new track from the Northwestern Pacific Depot, Mill Valley, to the Cascades. [E. R. J., Jan. 30, '15.]

Riverside, Cal.—The Pacific Electric Company has received permission from the Council to abandon portions of its second track franchise on New Magnolia Avenue in Riverside. The company will be granted a new double track franchise over the street with the understanding that if the second track is not installed within three years the city will have the power to require the company to place its tracks in the center of the street.

San Francisco, Cal.—The Board of Works has been directed to prepare plans and specifications and advertise for bids along the lines of Engineer O'Shaughnessy's plan No. 9 for the Church Street railway in San Francisco.

Evansville, Ky.—Extension of the Bell Street line of the Evansville Railway from Kentucky Avenue to the city limits is to be undertaken at once under a franchise which has just been approved by the Board of Public Works. The East End Improvement Association has subscribed a part of the money needed. Construction work will begin when the weather permits.

Henderson, Ky.—A thirty-year contract under which the Henderson Street Railway has been operating its lines in Henderson expires on Oct 21 and, although it is reported never to have declared a dividend the company wants to extend the contract on the same terms. There has been much agitation of the questions which have been raised in this connection and it is intimated rather definitely that the city authorities will require that certain conditions be complied with before action on extending the franchise is taken. Among these, it is said, will be extensions of the lines to outlying towns and establishment of schedule services on them before the Council votes a franchise.

Hamilton, Ont.—A special committee of the City Council will request the Hamilton Street Railway to build two cross town lines and also relay new tracks on several streets in Hamilton.

Toronto, Ont.—The Toronto & York Radial Railway will apply at the next session of the Ontario Legislature for power to construct a double track line on Yonge Street, from the Canadian Pacific Railroad to the north city limits of Toronto.

Three Rivers, Que.—The Three Rivers Traction Company has received a twenty-year franchise from the Council in Three Rivers.

TRACK AND ROADWAY

Gadsden, Ala.—Application for a charter will soon be made to build a 30-mile line between Gadsden and Centre, Ala. Louis Hart, Gadsden, is interested. [E. R. J., Nov. 7, '14.]

Mobile Light & Railroad Company, Mobile, Ala.—Two new loop lines to connect with its present tracks will soon be built by this company in Mobile.

Birmingham-Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company has completed its electric line in Tuscaloosa and will place it in operation at once.

Montecito Railroad, Las Angeles, Cal.—This company has placed in operation its electric railway over Montecito drive, beginning at the north end of Griffin Avenue and East Avenue Forty-seven in Los Angeles. W. L. Larrabee, president. [E. R. J., Aug. 22, '14.]

Hartford & Springfield Street Railway, Warehouse Point, Conn.—Plans are being made by this company for an extension from the local waiting station in Thompsonville through Main Street and across the Connecticut River, connecting at a point on Mapleton Avenue in Suffield with the present Suffield Street Railway.

***Washington, D. C.**—A recommendation to Congress for legislation that will permit the extension of electric lines to East Potomac Park will be made in the next annual report of the chief of engineers in Washington.

Palm Beach & Everglades Railway, West Palm Beach, Fla.—Offices have been opened by this company in the McGinley Building, West Palm Beach. Plans are being considered to award contracts in the near future to build this steam or electric railway from West Palm Beach westerly to a point 6 or 8 miles from the shore of Lake Okeechobee; thence south and northwesterly parallel with the shore of Lake Okeechobee to a point at or near Lake Hicopochee, the line to be about 75 miles. [E. R. J., Jan. 23, '15.]

Georgia Railway & Power Company, Atlanta, Ga.—Preliminary surveys have been made and plans are being considered by this company to build an extension to the site of the Oglethorpe University, about 1½ miles north of the present terminus at the DeKalb County line near the Capital City Country Club.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.—Plans are being considered by this company for improving its lines in Augusta.

Waycross Street & Suburban Railway, Waycross, Ga.—Plans are being made by this company to build an extension through the southern section of Waycross.

East St. Louis & Suburban Railway, East St. Louis, Ill.—This company is asked to consider plans to build its tracks along Main Street from Broadway to Missouri Avenue in East St. Louis.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—This company has decided to run its new line from Peoria to Canton on the most direct route from Hollis to Glasford and from Glasford direct to Canton. The Chapman Construction Company of Chicago is the engineer for the construction and the Woolf Company will sell the stock. A considerable amount of stock has been sold in both Peoria and Quincy. [E. R. J., Jan. 9, '15.]

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is now engaged in installing automatic block signals between Huntington and Peru, Ind., a distance of 25 miles. This work is being done in pursuance of the order of the Indiana Public Service Commission.

Union Traction Company, Coffeyville, Kan.—It is reported that plans are being considered by this company to extend the line from Coffeyville to Collinsville. Eventually this line will be extended south from Collinsville to Tulsa.

Arkansas Valley Interurban Railway, Wichita, Kan.—Plans are being made by this company to build ½ mile of new track within the city limits of Hutchinson. It will extend through the Carey district.

Hagerstown & Frederick Electric Railway, Frederick, Md.—Many plans for improvements of this railway during the summer are being considered by this company. One of the extensions contemplated is a branch from Hagerstown to Security, 2 miles east of Hagerstown, where the new power house of the company is located. Straightening curves and strengthening culverts over the entire system are also planned.

Boston, Mass.—Bids are desired until Feb. 25 by the Boston Transit Commission, 15 Beacon Street, Boston (B. Leighton Beal, secretary), for building Section H of the Dorchester Tunnel, located in Dorchester Avenue, between Old Colony Avenue and Woodward Street and is about 2200 ft. long. The structure is to be mainly of reinforced concrete and consists of a single-span double-track tunnel, to be built by the cut and cover method. The work also includes a pump well, an emergency exit and sewer changes. Specifications and forms of contract can be obtained at 15 Beacon Street, ninth floor. The right to reject any and all bids and to award the contract as is deemed to be for the best interest of the city of Boston is reserved.

United Railways, St. Louis, Mo.—This company is asked to consider plans to extend its lines along Tamm Avenue in St. Louis to Art Hill, in Forest Park.

International Railway, Buffalo, N. Y.—As soon as the legal preliminaries in connection with the construction of this company's line between Niagara Falls and Buffalo, permission for which was granted by the Public Service Commission recently, are concluded and the $2,395,000 bond issue floated, actual construction work will begin. This will probably be early in the spring. The company has yet to obtain permission of the State Canal Commission to bridge the Erie canal at Tonawanda, arrange with the New York Central and the Erie for crossing the tracks of the steam roads and obtain a few consents. While items for the construction of new carhouses at the Falls and stations along the line are included in the estimated cost of the line authorized by the Public Service Commission, the company has not yet definitely decided upon the exact location of these buildings. This is a matter that probably will not be decided upon until actual construction work is well under way.

Black River Traction Company, Watertown, N. Y.—Plans are being contemplated by this company to re-track its line on the Public Square in Watertown during the summer.

Cleveland (Ohio) Railway.—This company is asked to consider plans for an extension of the West Madison Avenue electric line from West 117th Street to Riverside Avenue, Lakewood. Other extensions and betterments of its lines in Cleveland are being contemplated.

Conneaut, Kingsville & Ashtabula Railway, Kingsville, Ohio.—Surveys have been completed by this company on its 14-mile line between Conneaut and Ashtabula. It has not been decided when construction will be begun. W. E. Hawley, Kingsville, president. [E. R. J., Oct. 26, '12.]

Ohio Valley Traction Company, Portsmouth, Ohio.—Right-of-way has been received by this company through eight pieces of property in Porter. Plans are being considered by this company to build its 23-mile extension from Sciotoville to Ironton within the next few months.

Portsmouth Street Railway & Light Company, Portsmouth, Ohio.—Plans are being made by this company to build an extension in Portsmouth.

Muskogee (Okla.) Electric Traction Company.—It is reported that R. D. Long, general manager of this company, plans to build an electric railway between Muskogee and Drumright.

Oklahoma & Interstate Railway, Oklahoma City, Okla.—An interurban line 130 miles long and connecting Columbus and Galena in southeastern Kansas with northern and central Oklahoma and Oklahoma City, will be begun this spring, according to John R. Rose, Oklahoma, president of this company. Mr. Rose put his proposal to the commercial clubs of the cities affected at a meeting recently. The cities represented were Columbus, Galena and Baxter Springs, Kan., and Commerce and Miami, Okla. Interurban lines already extend as far south as Columbus and Galena, and the representatives of the commercial clubs expressed the belief that the cities would co-operate to obtain the right-of-way and the money that has been asked for the line.

Sand Springs Interurban Railway, Tulsa, Okla.—It is reported that this company plans to build an extension this summer to Owasso Lake, north of Owasso, and that the new line will enter Tulsa over the tracks of the Sand Springs Railway, which would save the construction of 10 miles of new track.

Hamilton, Ont.—In order to improve the present railway service in Hamilton, Mayor Walters has suggested the construction of a crosstown line from the new Burlington Street line to Barton and King Streets, the tracks to be laid on Wentworth Street in Hamilton. Mayor Walters and the Board of Control were told by representatives of the Hamilton Street Railway on Jan. 26 that no railway extensions or important improvements could be thought of until the present war was over. Industrial and financial conditions made it impossible.

Kirkton, Ont.—It is reported that the Hydro-Electric authorities in Kirkton have agreed to the resolutions approving of the construction of a hydro-radial line in Kirkton, and also a hydro-radial line to connect London and Stratford, via St. Mary's.

London & Port Stanley Railway, London, Ont.—This company has completed the reconstruction of its track and roadbed on the line between London and Port Stanley and will proceed at once with the erection of the overhead construction.

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—Work will be begun in the spring by this company on the Perth to Smith Falls section of the electric railway which is making a belt 300 miles in length in Eastern Ontario. E. Malone, chief engineer. [E. R. J., Dec. 12, '14.]

Toronto, Ont.—Another step was taken on Feb. 4 toward a start upon the Toronto-Port Perry Hydro Radial Railway when the Hydro-Electric Power Commission of Ontario forwarded to the Provincial Government for approval the by-laws and contracts of eleven municipalities in the radial zone which have voted in favor of the establishment of a radial service. The contracts were from Scarboro, Markham, Pickering, Stouffville, Port Perry, Whitby town and township, Uxbridge and Whitchurch. As the system now stands it will comprise 94 miles of track. Two matters of importance have yet to be dealt with before work can be begun on the line. The entrance to Toronto must be agreed upon and will be taken up in the consideration of the general transportation question in Toronto. The other matter yet to be settled is that of a Federal subsidy to aid in the construction.

Toronto, Ont.—Ratepayers in Rosedale will seek legislation to compel the construction of an electric railway loop around Rosedale.

Toronto, Ont.—The city will oppose the application to the Ontario Legislature of the Forest Hill Electric Railway for an extension of its contract. The company's original bill gave them until December, 1913, to expend $50,000 in construction. An amendment extended the time to December, 1914, and now the company is asking until December, 1915. All that has been done up to the present is some grading work on Forest Hill Road. The bill was put through in the face of strenuous opposition by the city.

Toronto & York Radial Railway, Toronto, Ont.—Plans are being considered by this company to build a double track line on Yonge Street, from the company's southerly terminals to the north limits of the city of Toronto.

***Klamath Falls, Ore.**—An electric railway is being planned from Eureka, Cal., up the coast to Requa, and thence up the Klamath River to Klamath Falls according to an announcement recently made. D. W. Hanson, president of the Eureka Development Association, Eureka, Cal., is interested.

***Chambersburg, Pa.**—Application for a charter will soon be made to build an electric railway to connect McConnellsburg and Fort Louden, a distance of 10 miles. Edward J. Post, D. H. Patterson and Herbert A. Duffy are among those interested.

***Monaca, Pa.**—It is reported that residents of Monaca, Pa., will organize a company to build an electric line from Monaca south to Coraopolis, about 20 miles. J. W. Reid, D. J. Mitchell, J. J. Allen and H. L. Grimmell, all of Monaca, are among those who are reported to be interested in the project.

Joplin & Pittsburgh Railway, Pittsburgh, Pa.—Plans are being considered by this company to build an extension of its line from Dunkirk, Kan., to Arcadia, Kan., via Hazen and other coal camps, probably within the next few months.

Pottstown & Phoenixville Railway, Pottstown, Pa.—This company has placed in operation its extension from Sanatoga Park to Linfield. Grading has been begun on the section between Linfield and Spring City.

Bristol (Tenn.) Traction Company. — This company has been asked to consider plans for an extension of its line from Big Creek into the Shady Valley section of Johnson County.

Jonesboro, Tenn.—In the interest of the project to connect Jonesboro and Johnson City, 7 miles distant, by an electric railway, Mayor A. S. Murray has appointed a committee composed of J. H. Epps, J. H. Anderson, R. M. May, A. L. Shipley and J. S. Pritchett to confer with representatives of Johnson City and the Tennessee Eastern Electric Company. Jonesboro has voted bonds of $25,000 to further the project, and it is proposed that Johnson City issue an equal amount and that the electric company make up the remainder. Six miles of railway would be necessary to connect with the Johnson City line, and it is estimated that construction and equipment would cost from $75,000 to $100,000.

Portland, Vancouver & Northern Railway, Vancouver, Wash.—Surveys have been begun to determine the most practicable route for an electric line in Vancouver to extend east of Garrison, to be constructed by this company. [E. R. J., Feb. 6, '15.]

SHOPS AND BUILDINGS

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A lease for a term of years of the entire eighth floor of the new Stuart building at Fourth and University Streets, owned by the Metropolitan Building Company, has been made to the Puget Sound Traction, Light & Power Company, whose offices, long located in the Pioneer Building at First and Yesler Streets, will be removed to the new quarters at once.

POWER HOUSES AND SUBSTATIONS

Pacific Gas & Electric Company, San Francisco, Cal.—The contract between this company and the Great Western Power Company, whereby the latter supplies the former company with electric power, has been renewed for eighteen months.

Holyoke (Mass.) Street Railway.—This company is increasing the capacity of its Berkshire Street plant.

Manufactures and Supplies

ROLLING STOCK

Warren-Bisbee Railway, Warren, Ariz., during 1915 will probably purchase two closed cars.

Gary, Hobart & Eastern Traction Company, Hobart, Ind., will purchase two interurban and one baggage and express car during 1915.

Charles City-Western Railway, Charles City, Ia., expects to purchase two interurban cars, one electric locomotive and three city cars during 1915.

Manhattan City & Interurban Railway, Manhattan, Kan., expects to purchase several trailers and good single-truck motor cars during 1915.

Charleston-Dunbar Traction Company, Charleston, W. Va., expects to purchase one motor express car and one electric locomotive during 1915.

Kansas City, Clay County & St. Joseph Railway Company, Kansas City, Mo., has ordered five all-steel cars from the Cincinnati Car Company. The cars will have a seating capacity of 68; length over all, 59 ft.; length over body, 58 ft.; length of smoking compartment, 14 ft. 8 in.; extreme width, 9 ft.; truck centers, 37 ft.; dia. of wheels, 36 in.; wheelbase, 7 ft.; width of seats, 40 in.; width of aisle, 22 in. The specifications call for a center entrance arranged somewhat along the lines used on this company's present center-entrance equipment, except that the smoking compartment will be smaller. This is accomplished by an additional partition separating one-half of the car into smoker and passenger compartments. The equipment will include four 100-hp motors; air brakes, both automatic and straight. The seats will be of the Hale & Kilburn type with those in the passenger compartment upholstered in green plush, while those in the smoking compartment will be covered with a black fabrikoid. The interior finish of the car body will be mahogany, and all windows will be fitted with storm sashes. The ceilings of the car body are to be of steel with no covering, so that the carlines are exposed. Heat and ventilation are furnished by Peter Smith heaters and sixteen 8-in. Railway Utility ventilators.

Interborough Rapid Transit Company, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 9, 1915, as having ordered twelve all-steel subway cars from the Pressed Steel Car Company, has specified the following details for this equipment:

Date of delivery, about May 1
Length over body corner posts.....39 ft. 4 in.
Length over draw-bars, 51 ft. 4 in.
Width over side sills 8 ft. 6¾ in.
Width over window sills 8 ft. 10 1/16 in.
Bolster centers, length, 36 ft.
Interior trim steel
Roof monitor
Air brakes, Westinghouse automatic
Axles...ry. std., heat treated
Bumpers, Hedley anti-climber
Car trimmings...Aero metal
Control, 6 West., type A B F
6 G. E., type PC
Couplers, West. automatic, car, air & electric
Curtain fixtures, Cur. Sup. Co.
Curtain material...Pantasote
Gears and pinions, stub-tooth, oil-tempered
Hand brakes....geared type
Journal boxes.....ry. std.
Motors,
Two 100 hp, field control
6 equipments, West. 302-F2
6 equipments, G.E. 240-C
Seats, Hale & Kilburn, rattan
Springs....Std. Steel Works
Trucks, Hedley cast steel frame type, built by Brill
Wheels.....solid rolled steel

TRADE NOTES

Asbestos Protected Metal Company, Pittsburgh, Pa., has removed its head office from Beaver Falls to the First National Bank Building, Pittsburgh, Pa.

Cambria Steel Company, Philadelphia, Pa., will appoint C. B. McElhany, who has been assistant general manager of sales, to the position of general manager of sales, succeeding J. Leonard Replogle.

Cement-Gun Construction Company, Chicago, Ill., has received a contract to encase all the structural steel work on the new power house now being erected by the Ford Motor Company at its Detroit factory.

Murphy Varnish Company, Newark, N. J., at a meeting of its board of directors on Jan. 12 created the office of chairman of the board and appointed Franklyn Murphy to that position. Franklyn Murphy, Jr., was appointed to succeed his father as president of the company. John J. Nicholson succeeds Mr. Murphy, Jr., as vice-president. The office of second vice-president was abolished.

J. Leonard Replogle, vice-president and general manager of sales of the Cambria Steel Company, with headquarters in Philadelphia, has terminated, by resignation effective March 1, 1915, a connection of twenty-six years with that company and will become vice-president and general manager of sales of the American Vanadium Company. His new headquarters will be at both New York and Pittsburgh.

Titan Storage Battery Company, Newark, N. J., owing to the existence of a battery jar marketed under the name "Titan" and the fact that any battery using these jars might appear as a Titan battery, has changed its name to the General Lead Batteries Company. No change whatever in ownership, officers or policy is involved. The change is made entirely to avoid confusion.

Industrial Works, Bay City, Mich., has added to its extensive line of locomotive and wrecking cranes, a small locomotive bucket crane operated by a gasoline engine. This crane is especially adapted for light or intermittent work, such as handling coal, ashes, etc., or for service in places where the use of steam is objectionable. A crane of this type has a further advantage in that it is always available for immediate use without waiting to get up steam. In operation it should be very economical as there is no waste of fuel when the crane is not actually working.

Union Switch & Signal Company, Swissvale, Pa., has appointed Thomas S. Grubbs, auditor and secretary of the Westinghouse Machine Company, as secretary and assistant treasurer. George F. White, of the Westinghouse Machine Company, has been appointed assistant secretary of the signal company. Mr. Grubbs has been with the machine company for twenty-seven years and was one of the oldest employees, having previously been with the Philadelphia company which was owned by the Westinghouse interests. Mr. White has been with the machine company for the past eleven years.

Edison Storage Battery Company, Orange, N. J., has had a pleasant custom for several years, in common with other Edison interests, of celebrating in a quiet but loyal way, Feb. 11, the birthday of Mr. Edison. The custom, in which all of the employees of the Edison interests as well as a number of Mr. Edison's intimate friends participate, is to wear a small ribbon or button containing Mr. Edison's portrait in the left lapel of the coat. As Mr. Edison was born in 1847, he is sixty-eight years old this year. The *esprit de corps* of the Edison organization, which is always very strong, is intensified this year by the energy which the company and its distinguished chief have exhibited in rehabilitating the works after the fire a short time ago.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, reports shipments during the month of January to the following railway companies: Roanoke (Va.) Railway & Electric Company; Boston & Maine Railroad, North Adams, Mass.; Great Northern Railway, Cascade Tunnel, Wash.; Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; Scranton (Pa.) Railway; Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.; New York & Long Island Traction Company, Hempstead, L. I., N. Y.; Niles Car & Manufacturing Company, for new cars of East Liverpool Traction & Light Company; Cincinnati Car Company for new cars of Corpus Christi Street & Interurban Railway; Philadelphia & Western Railway, Upper Darby, Pa.; Wausau (Wis.) Street Railroad; Jamestown (N. Y.) Street Railway; Osgood-Bradley Car Company, for new cars of Richmond Light & Railroad Company; Empire United Railways, Syracuse, N. Y.; St. Petersburg & Gulf Railway, St. Petersburg, Fla.; Muskegon (Mich.) Traction & Lighting Company; San Antonio (Tex.) Traction Company; Lincoln (Neb.) Traction Company; Texas City (Tex.) Street Railway; Central New York & Southern Railway Company, Ithaca, N. Y.; Altoona & Logan Valley Electric Railway; Des Moines (Ia.) City Railway.

Kennedy-Stroh Corporation, Pittsburgh, Pa., with a capitalization of approximately $2,500,000, has taken over all rights, processes and factories of the Kennedy Manufacturing & Engineering Company, New York, the Stroh Steel Hardening Process Company, the Lawrence Steel Casting Company and the Best Manufacturing Company, Pittsburgh, Pa. The corporation will operate as a main plant the factory at Oakmont, Pa., formerly operated by the Best Manufacturing Company, also the old Lawrence Steel Plant at Thirty-second Street and A. V. R. R., Pittsburgh, as the Lawrence department. The Kennedy line of mining, crushing, cement making and conveying machinery is one of the most extensive of American manufacture. The Stroh steel hardening process is a method of casting two kinds of steel in one solid casting in such a manner that the hard alloy comes on, and only on, the parts which are subjected to wear. The Lawrence Steel Casting Company, which was established in 1883, is one of the first concerns of its kind in the Pittsburgh district, and is well known. The Best Manufacturing Company has been manufacturing a line of power piping flanges, fittings and valves for thirty years and has made some of the largest piping installations in service in the United States. W. H. Schoen, formerly connected with the Schoen Pressed Steel Company, now the Pressed Steel Car Company, is president of the new corporation and will be the active business head. J. E. Kennedy, who is vice-president and chief engineer, has been well known as a designer of mining and other machinery for more than twenty years. J. L. Kendall, of the Kendall Lumber Company and allied interests, is treasurer. J. D. Hiles, who has been connected with the Best Manufacturing Company for the past fourteen years, is secretary. W. Y. Stroh of the Stroh Steel Hardening Process Company, is general manager and metallurgist.

ADVERTISING LITERATURE

Ohio Brass Company, Mansfield, Ohio, has issued a folder describing and illustrating its O. B. trolley retriever.

American Veneer Company, Hoboken, N. J., has issued a folder describing its three-ply laminated wood headlining for railway and street cars. The headlinings are light and substantial and are supplied ready for installing in any required curve. They are furnished in the following woods: mahogany, quartered oak, birds-eye maple, white maple, sycamore, plain oak and poplar.

Terry Steam Turbine Company, Hartford, Conn., has issued a sixty-four page bulletin on the subject of centrifugal pumps. The bulletin gives details and data on various turbo-pump applications. The principles of operation and construction of the centrifugal pump are fully explained, as are the details of the steam turbines, which have been used during the past ten years for driving them. Because of the wide latitude of speed possible with the turbine the unit occupies a much smaller space than would be required for performing the same duty but driven by a reciprocating engine. The range of conditions in this service varies from large volumes of water pumped against low heads up to high head work. Special attention is directed to the reliability of these pumping units and freedom from shutdown owing to accidents, repairs or packing renewals.

Delta-Star Electric Company, Chicago, Ill., has issued Bulletin No. 15, which describes and contains 188 illustrations of its "unit type" high-tension indoor equipment, including switches, fuses, choke coils and entrances. These insulators are said to eliminate the disadvantages and embody the good points of both pillar and post types, in that the top and bottom fittings are adjustable, detachable and occupy minimum space. The unity type insulator consists of a corrugated pillar, each end having a socket, into which is "key cemented" a threaded malleable iron thimble. By means of standard bolts any desired fitting can be secured to an insulator unit. "Key cementing" thimbles into the insulator ends to receive fittings rather than clamping fittings around the outside maintains a maximum creepage distance between live parts and ground. The voltage ratings conform to the standard commercial pressure of 6600, 13,200 and 22,000 volts. At the end of the bulletin is a technical data section, containing a number of useful tables essential for reference in dealing with busbar operation. This company has also issued Bulletin No. 20, which describes its high-capacity outdoor substation high-voltage equipment, including pole-top air-brake switches and S. & C. lightning arresters.

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Taken from A. F. Comstock's Review in the Engineering Record May 30, 1914

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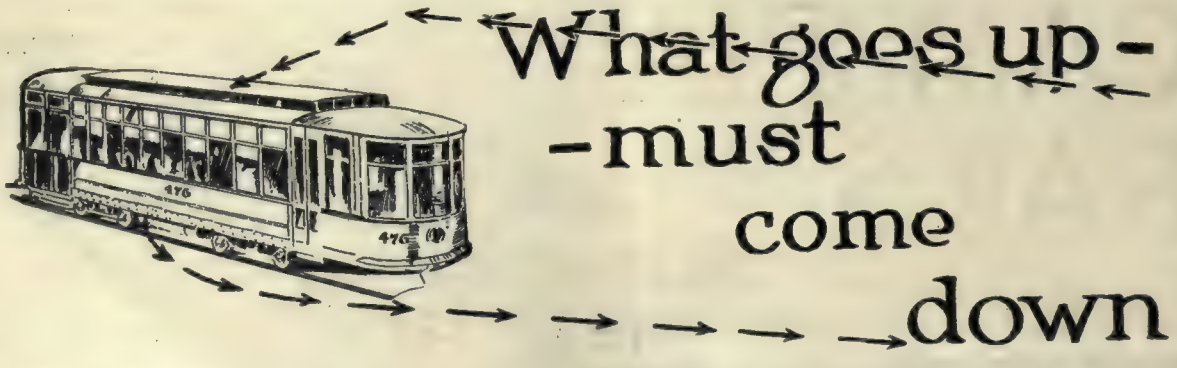
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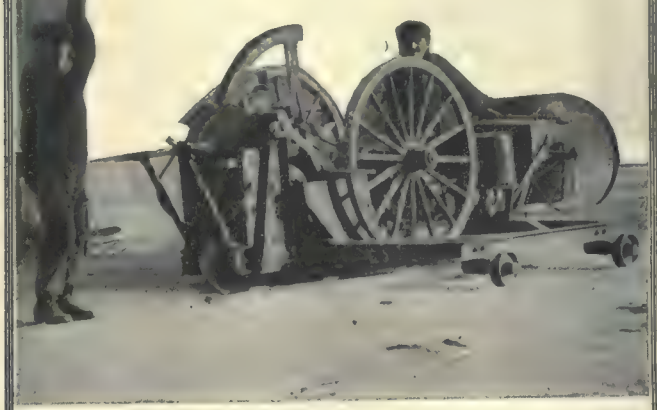
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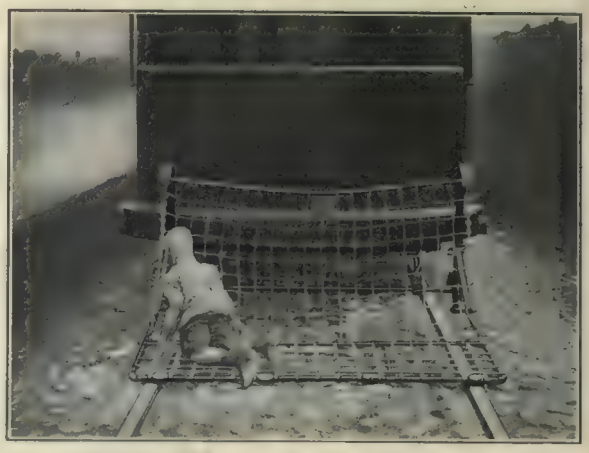
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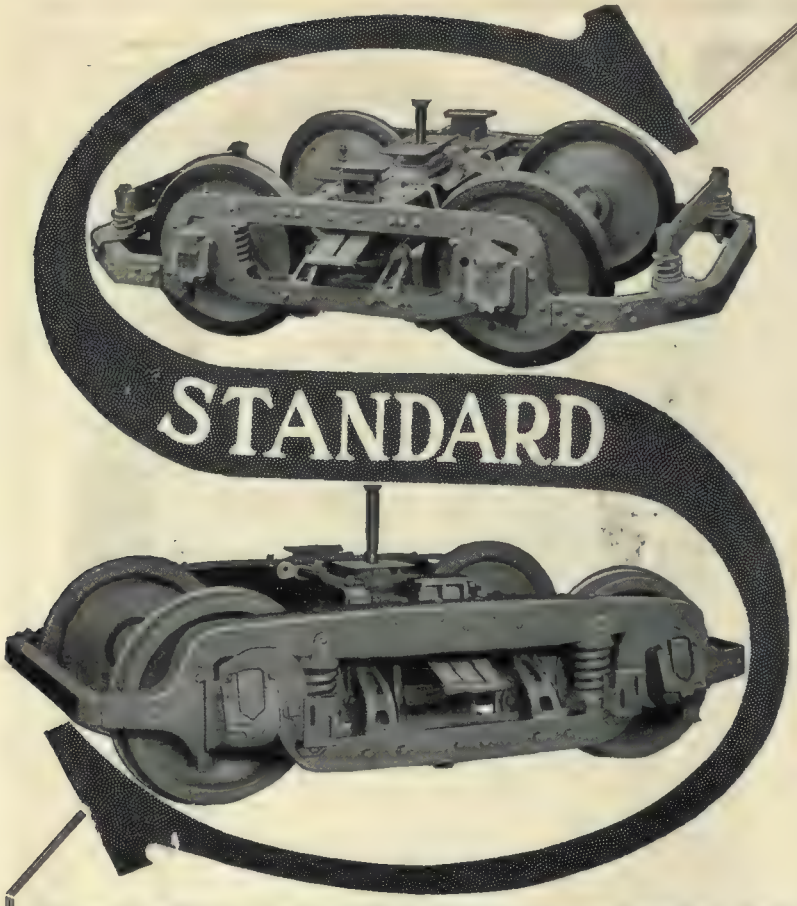
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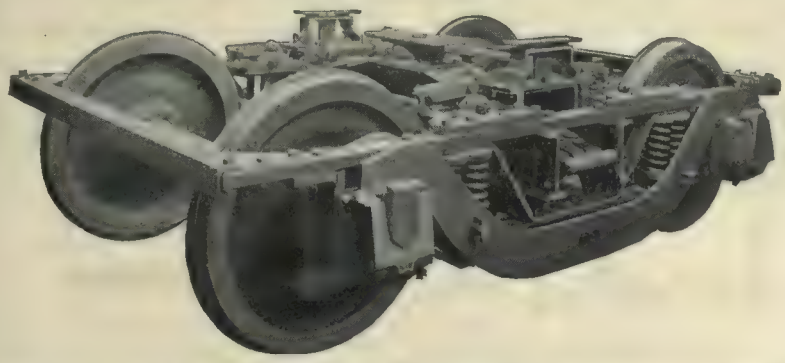
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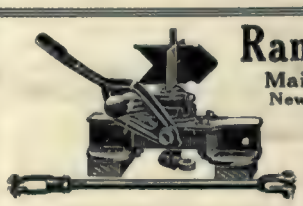
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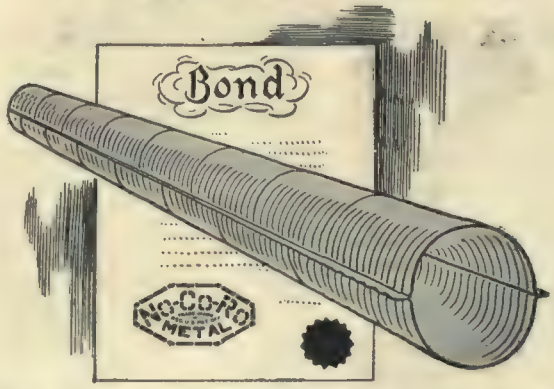
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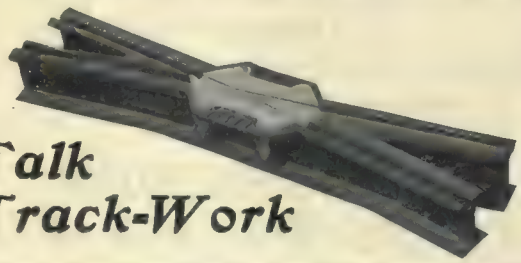
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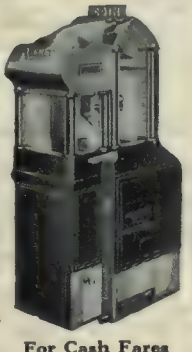
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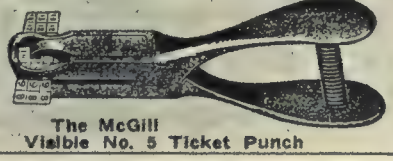


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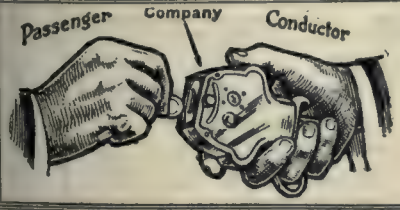
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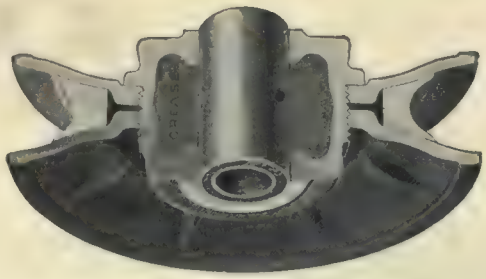
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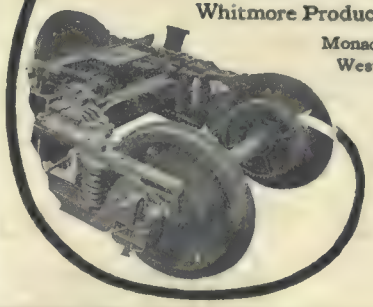
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All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street, NEW YORK, N. Y.

MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.

2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

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Two Snow Plows: One Sprinkler: Cars, Motors, Rails, Generators. Everything for Track, Rolling Stock, Power Plant bought and sold. Send us your requirements.

Write for our Lists and Catalogs.

Railway & Power Equipment Co.

Charles F. Johnson P. O. Box 155 Ellicott Sq., Buffalo, N. Y.

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FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.



Do Not Scrap Your Old Coils

Save money by having them rejuvenated. An impregnated coil is far better than a new one and costs about 40% less.
Write for our prices.

Federal Electrical Mfg. Co.
626 Federal St., Chicago

Save Your Old Field Coils

and let us make them over into

NEW FIRE-PROOF COILS

At the same time increase their capacity at Peakload five to ten times.

The W. R. GARTON COMPANY
CHICAGO

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

150 K.W. Motor Generator Set

1—220 H.P., 3 phase, 60 cycle, 2080 volt, 514 R.P.M., General Electric induction motor, direct coupled to 150 K.W General Electric, 550 volt, CLB, compound wound generator. Instant shipment.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.

Complete with coupling and panel.

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

9—West. 112 Motors, 75 H.P., newly rewound.
5—Type M, Single End Control for 4 motors, 75 H.P. ea.
2—K. 14 controllers.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338-4339 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

An Unusual Bargain

One double truck, single track snow plow, length over all 40 ft., width 8'6", height 10'9", truck centers 13'8". wheel base 4'. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

Price $1,000, F.O.B. Rensselaer, New York.

Albany Southern R. R. Co.
Rensselaer, N. Y.

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, best of experience, good worker, efficient in handling men, or will work under good fireman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 675, Elec. Ry. Jour.

GRADUATE civil engineer. Experienced in track, overhead, car equipment and building construction, and maintenance drafting, estimating, valuation, car schedules, and traffic data. At present supt. track and overhead. Desires change. Box 676, Elec. Ry. Jour.

HIGH-GRADE manager of railroad and public utility properties open for engagement. Desire to change on account of climate. Box 522, Elec. Ry. Jour.

POSITION wanted by young man with valuable electric railway experience embracing all activities of way department, together with valuation work. Investigations of traffic conditions, service, and fare regulations, etc. Best of references. Box 664, Elec. Ry. Jour.

PRACTICAL engineer, many years' experience, seeks position as General Supt., supt. motive power or master mechanic; wide experience all branches both mechanical and electrical from power house to track, including operation; expert in car design and maintenance; best references. Box 662, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.	11.60
1-4 page,	20.00	8 in. single col.	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

STOREKEEPER, thoroughly acquainted with all electric railway material and accounts, desires change. Can cut the mustard in regard to efficiency and economy. Box 674, Elec. Ry. Jour.

WANTED—A position as barn foreman or master mechanic of a road of about 75 cars. Strictly sober; 15 years' experience in remodeling old cars; also equipping new cars. Can give past and present references. Can come at once. Box 682, Elec. Ry. Jour.

YOUNG man desires position as auditor of electric railway company. At present so employed. Best of references. Box 679, Elec. Ry. Jour.

POSITIONS VACANT

WANTED—Bookkeeper, young man, to take charge of set of books of street railway company; must have had previous experience and be able to furnish satisfactory references. Give both in application. Address Box 668, Elec. Ry. Jour.

WANTED—A thoroughly reliable and competent general freight and passenger agent. A good opening for one thoroughly posted in all details of the passenger traffic business with some knowledge of freight traffic. Location, Middle West. Give full information regarding experience, standing and salary desired. Address Box 681, Elec. Ry. Jour.

FOR SALE

Chestnut Poles For Sale

We furnish A, B, C and E grades in any length, 20′ to 75′ and stubbs, chestnut poles and R.R. ties, locust posts and hardwood lumber and timbers. A good stock of poles on hand. Can make prompt shipments. Address Lewis Lumber Co., Relief, N. C.

25-Tons 6″ HIGH "T" RAILS

POLES AND PILING

NEW CYPRESS. PRICES LOW.

ZELNICKER — WALTER A. ZELNICKER SUPPLY COMPANY — St. Louis

New and Relaying Rails,—Equipment—Tanks—Etc.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.
The Alphabetical Index (see eighth page following) gives the page number of each advertisement.
As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.
If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys, Steel and Iron.
Titanium Alloy Mfg. Co.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Architects.
Kennard, Ralph B.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Protective Signal Mfg. Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Protective Signal Mfg. Co.
Reiter, G. C.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Imp. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Creaghead Engineering Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Western Electric Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Dump.
Universal Car & Mfg. Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Chisholm-Moore Mfg. Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.
Wasson Engrg. & Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Chas. F. Etter.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coil Impregnation.
Federal Electrical Mfg. Co.

Coin-Counting Machines.
Johnson Fare Box Co.

Commutator Slotters.
American General Engrg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Engrg. Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co., Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.



Le Carbone

—the always Uniform always Efficient carbon brush.

W. J. Jeandron
173 Fulton St., New York

The Highest Development

In Very Small Indicating Instruments for Direct Current

is marked by the

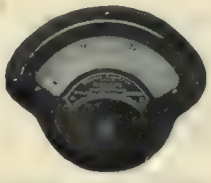
Weston

Miniature Precision Instruments



MODEL 280, Single Range Portable Voltmeter
(One-quarter Size.)

PORTABLE
Volt-Meters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
are supplied in single, double and triple ranges, the Triple Range Volt-Ammeter comprising six instruments in one. This group also includes BATTERY TESTERS.



MODEL 267, Switchboard Ammeter.
(One-quarter Size.)

SWITCHBOARD
Voltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.
They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate, dead beat and extremely sensitive.
They may be left continuously in circuit at full load and are shielded against external electrical and magnetic influences.
They are substantially constructed and have the longest scale ever provided in instruments of similar size.
The prices are surprisingly low for instruments of such quality.
The several models and ranges offer a selection from over 300 different combinations. They are listed in BULLETIN NO. 8, WHICH WILL BE MAILED UPON REQUEST.

Weston Electrical Instrument Co., Newark, N. J.

New York	St. Louis	Detroit	Richmond	Winnipeg
Chicago	Denver	Cleveland	Toronto	Vancouver
Philadelphia	San Francisco	Buffalo	Montreal	Berlin
Boston		Atlanta		London

TRADE

MORGANITE
Brushes

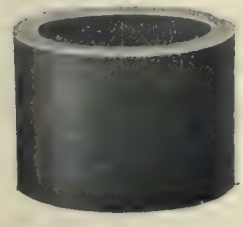
Prescribed—not merely sold.

The Morgan Crucible Co., Ltd.
120 Liberty St., New York
Factory Brooklyn

MARK

LONGWEAR BUSHINGS

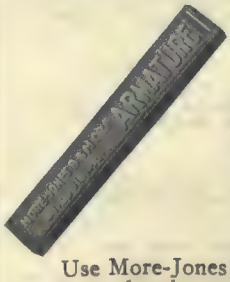
Hardened Steel
Accurate
Uniform



Dimensions Exactly as You Specify

E.G. Long Company
50 Church Street New York

THE RIGHT BABBITT IN THE RIGHT PLACE MEANS RIGHT SERVICE



More-Jones' 24-grades of babbitt metal enables us to furnish just the kind of babbitt that will give the best result in a given service. Our armature babbitt is made especially to stand up under severe armature service. It is used exclusively by many leading electric railways.

Use More-Jones babbitt and obtain maximum mileage per bearing replacement.

MORE-JONES BRASS & METAL CO.
ST. LOUIS, MO. 6

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Western Electric Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Chisholm-Moore Mfg. Co.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplpies Co.
Garton Co., W. R.
Imperial Rubber Co.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg. Co.
Chisholm-Moore Mfg. Co.
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co., The.
Railway Supply & Curtain Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Derailing Devices.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.

Detective Service.
Wisch Service, P. Edward.

Disinfectants.
Gardner & Co.

Door Operating Devices.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Herrick, Albert B.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Kennard, Ralph B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Schott Co., W. H.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Allis-Chalmers Mfg. Co.
Westinghouse Machine Co.

Engines, Steam.
Allis-Chalmers Mfg. Co.
Westinghouse Machine Co.

Fare Boxes.
American General Engrg. Co.
Brill Co., The J. G.
Cleveland Fare Box Co.
Dayton Fare Recorder Co.
Johnson Fare Box Co.

Fences, Woven Wire and Fence Posts.
American Steel & Wire Co.

Fencing Wire.
American Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cincinnati Car Co.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.
Western Electric Co.

Fibre.
American Vul. Fibre Co.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.

Fire-proofing Material.
Johns-Manville Co., H. W.

Fittings, Malleable, Cast Iron & Brass.
National Tube Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns-Manville Co., H. W.
Western Electric Co.

Forgings.
American Bridge Co.
Bliss Co., E. W.
Standard Motor Truck Co.
Standard Steel Works Co.

Forging & Punching Machinery.
Bliss Co., E. W.

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Johns-Manville Co., H. W.

Gaskets.
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.

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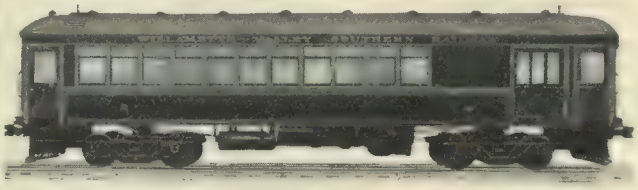
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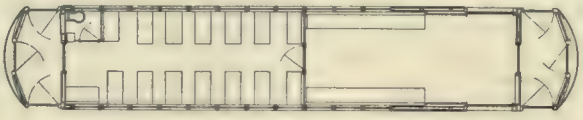
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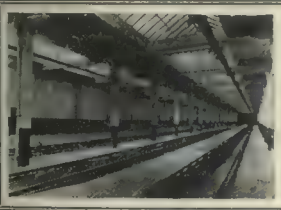
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ALPHABETICAL INDEX TO ADVERTISEMENTS

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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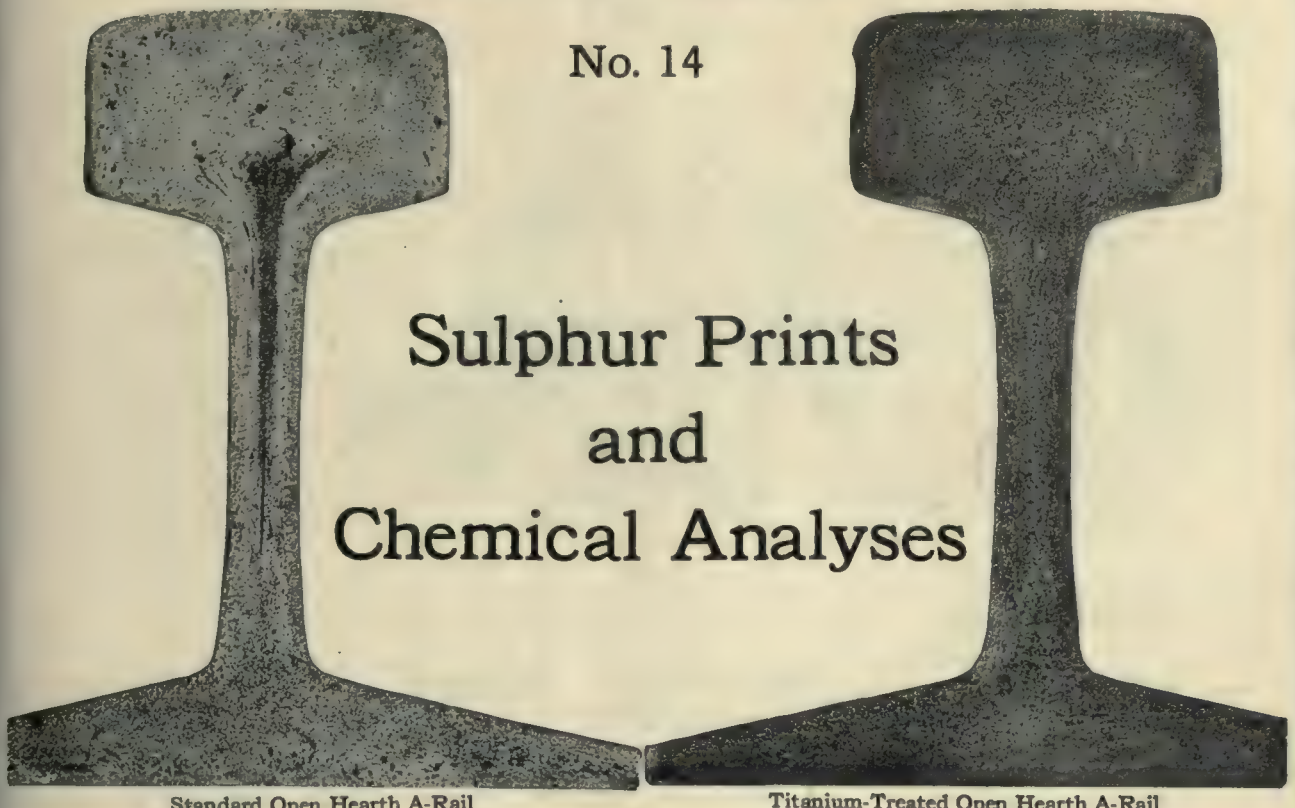
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TITANIUM IN RAIL STEEL

No. 14

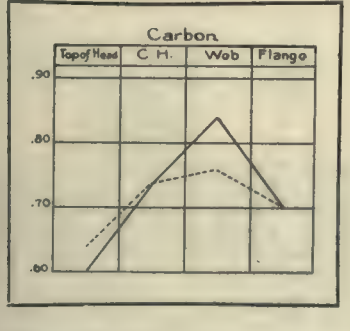


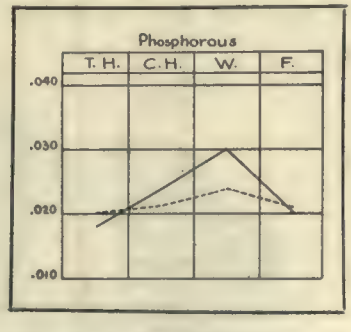
Sulphur Prints and Chemical Analyses

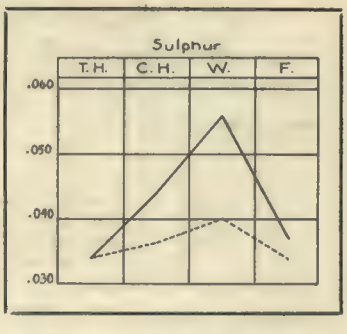
Standard Open Hearth A-Rail

Titanium-Treated Open Hearth A-Rail

It is a well known fact that Carbon, Phosphorus and Sulphur segregate along similar lines. Diagrams below—showing average segregation of Carbon, Phosphorus and Sulphur in 17 Samples of Standard and 17 of Titanium Treated Open Hearth A-Rails reported upon in Bulletins 1 to 7 inclusive prove this fact and show graphically the greatly reduced segregation of these elements in the Titanium-Treated Rails.







Standard

Titanium Treated

In studying Sulphur Prints it should be remembered that excessive segregation of Sulphur there illustrated indicates similar segregation of Carbon and Phosphorus—those two dangerous embrittling elements.

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Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

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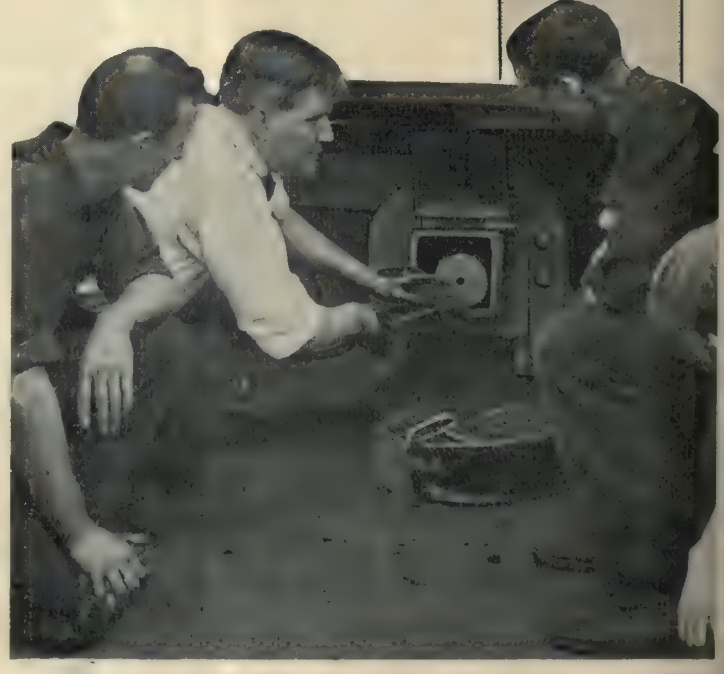
Galena Service is not a case of explaining what to do—

—it's DOING

Galena experts work with and for your men—establish their proper co-operation with efficient methods—and through the medium of Galena Oils produce a saving in your lubricating cost.

A Galena contract makes no restrictions on the quantity of oil to use—quantities may vary but the cost cannot go above the guaranteed maximum.

Why not get ALL the details of the savings we are ready to guarantee under contract?



Galena Signal Oil Co.

Franklin, Pa.

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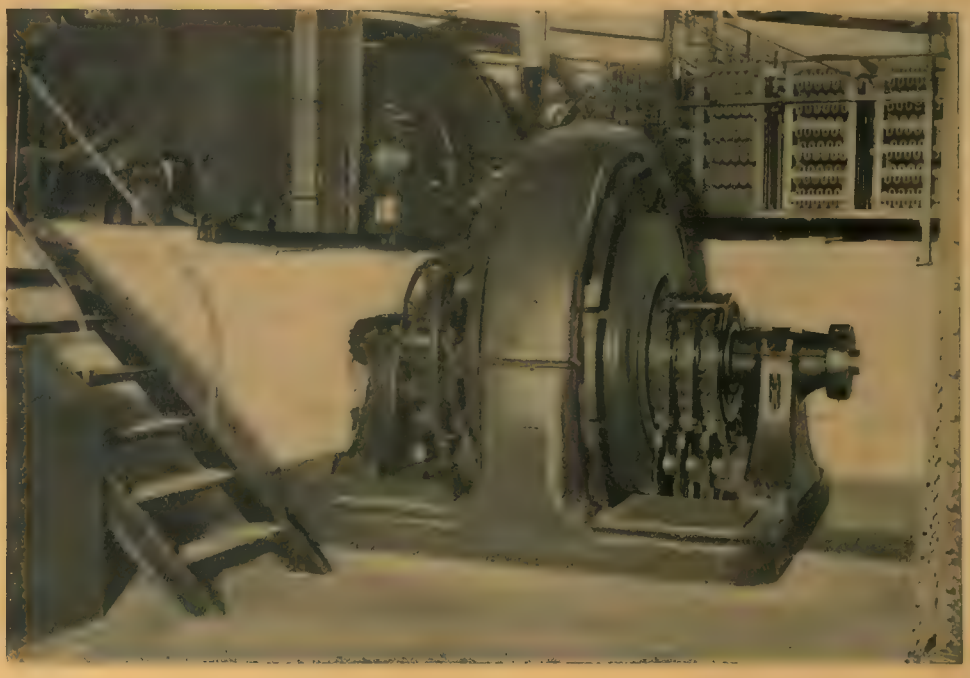


"THE provision of a short bearing for the equalizing bars on the journal boxes by means of pockets was a special feature of the first Brill No. 27-M.C.B. Truck built and has been a special feature ever since. It cuts nearly one-half from the length of the bearing of the ends of the equalizers and so lets the box move up and down between the pedestals with a minimum of friction. The longer the bearing of the equalizers the greater the friction because the longer bearing holds the box rigidly in a canted position and makes it scrape and grind. A steel plate, 1/8-in. thick, is put in the bottom of each pocket to prevent the equalizers from wearing into the boxes."

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G-E 60 Cycle Synchronous Converters Prove Successful on 168 Mile Transmission Line

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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

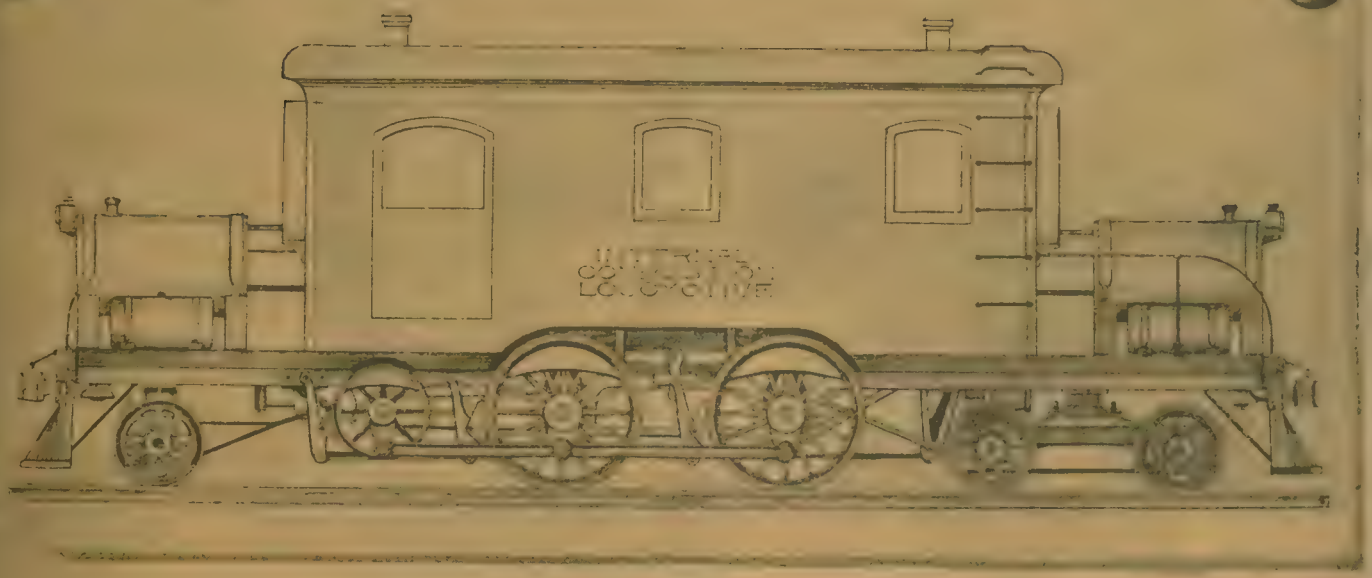
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ELECTRIC RAILWAY JOURNAL

Volume 45
Number 8
Feb. 20, 1915

McGraw Publishing Co., Inc.

HOUSTON ... RAILWAY ... LIBRARY ... HOUSTON, TEXAS.



40-Ton Gasoline Locomotive

Operated from either end.
Constructed to take short curves.
Speeds to 60 miles per hour
Clutch operates pneumatically.
Especially applicable to Elevated and Interurban Railways and for Terminal and other Railroad service.
ONE-MAN OPERATION.

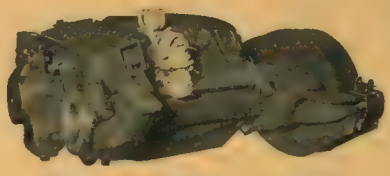
Heats and lights its own train.
Standard Gauge and Standard equipped with couplers and airbrakes.
Economical in its use of fuel.
"Picks-up" quickly and "gets away" speedily.
Has 54-inch drivers.
Is very responsive to its control.

WRITE US ABOUT THIS 40-TON, DOUBLE-END PROPOSITION. IT WILL PAY YOU!

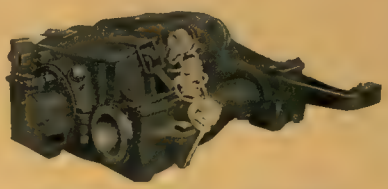
INTERNAL COMBUSTION LOCOMOTIVE COMPANY
Equitable Building, Wilmington, Delaware
J. W. McKay, Gen. Mgr.



No. 323-V—35 HP
Split Frame



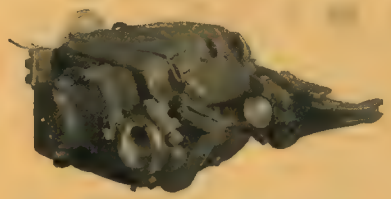
No. 532-B—40 HP
Box Frame



No. 632-B—40 HP
Split Frame



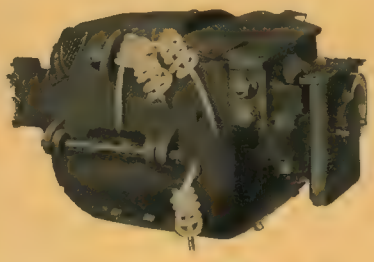
No. 307-V—45 HP
Split Frame



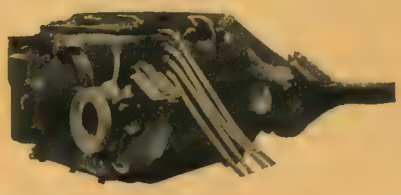
No. 307-CV—45 HP
Box Frame



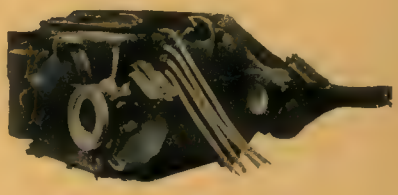
No. 306-CV—55 HP
Box Frame



No. 306-V—55 HP
Split Frame



No. 547-A—60 HP
Box Frame



No. 548-A—75 HP
Box Frame

All railway men recognize the great value of

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Westinghouse Railway Motors Are the Recognized Standards of Ideal Construction

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Toledo, Ohio
Washington, D. C.
*W. E. & M. Co. of Texas

Electric Railway Journal

New York, February 20, 1915

Volume XLV No. 8

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This new semi-steel car, which is designed especially for crosstown service, combines the principles of the near-side and center-entrance types, and also the pay-as-you-leave and pay-as-you-enter systems of fare collection.

ELECTRIC RAILWAY JOURNAL, Feb. 20, 1915. 4½ cols.

Results Obtained by Instruction Department, New York State Railways, Rochester Lines 367

The author, George Lawson, who is supervisor of employment and instruction, describes the methods of instruction employed and the remarkable reduction in number of accidents secured by concentration of effort on instruction of new platform men.

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In a letter to the editors, O. T. Crosby suggests certain changes in the present code. The sliding scale of returns to capital is discussed and co-operation with other public utility associations recommended.

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ELECTRIC RAILWAY JOURNAL, Feb. 20, 1915. 2½ cols.

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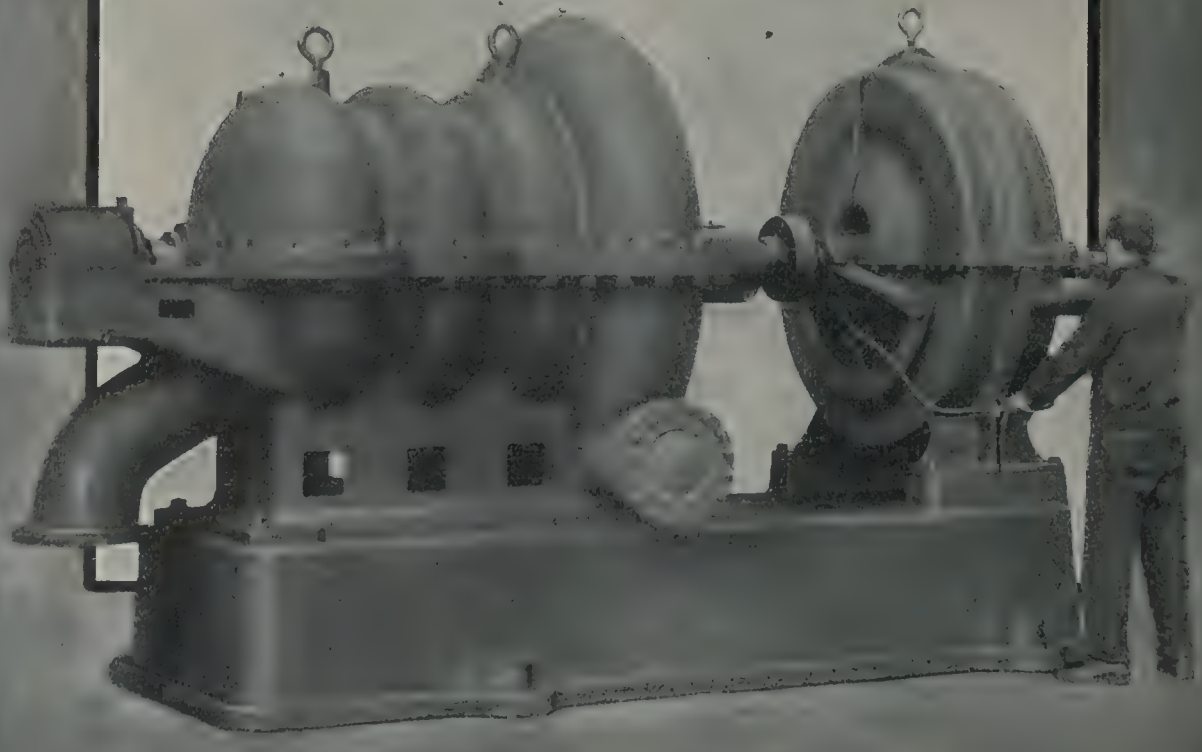
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High efficiency, long life and simplicity are the characteristic features of Westinghouse Turbine-Driven Pumps, which are built for high and low heads and all capacities.

The Westinghouse Machine Co.,
Prime Movers & Auxiliaries,
East Pittsburgh, Pa.



SPEED

(Speed is good, Safety is better, Speed-Safety is best)

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ELECTRIC OPERATION TENDS TOWARDS HIGH SPEEDS. SUBWAY AND ELECTRIC TRAIN MOVEMENT COMPARE WITH THE BEST STEAM ROAD SCHEDULES, WHILE "A MILE A MINUTE" IS COMMON ON INTER-URBAN LINES.

SPEED IS GOOD IF SAFE. AIR BRAKES CONTROL SPEED. THE BEST BRAKES CONTROL SPEED BEST.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

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These statements are subject to audit by the Bureau at any time without previous warning—just as a bank is subject to audit by a bank examiner.

Detailed information in regard to circulation may be secured from the Audit Bureau by any advertiser or prospective advertiser.

Advertisers now have, therefore, the means for securing circulation facts verified by an independent source.

Electric Railway Journal is a member of the Audit Bureau of Circulations.

This publication has nothing to hide. All facts regarding Electric Railway Journal subscribers are open to everybody.

Advertisers who believe that they are entitled to know what they are buying are urged to insist on an A. B. C. statement from every publication in which they are considering the use of space.

Any publication that supplies an A. B. C. statement thereby shows its willingness to have its circulation facts verified by an impartial organization which has merited the united approval of the biggest advertisers and the best publications.

Concentrate your advertising appropriation in the A. B. C. papers and compare the A. B. C. statements to learn which paper offers you the best value for your money—not merely in gross quantity of circulation, but in useful, self-renewing, buying-power circulation.

Mr. Russell Whitman, Managing Director of the A. B. C., 330 Railway Exchange Building, Chicago, will gladly supply any advertisers with details.

Buy Certified Circulation Only



An Oil Signal Room Is Unnecessary

You can eliminate the expense and annoyance of filling and cleaning signal lanterns, taking them off and putting on cars, and breakage in handling, by equipping your cars with

O-B Electric Car Signals

Used by many large roads and daily proving savers of time, money, trouble and uncertainty of operation.

Conservative figures show that the maintenance cost of O-B Electric Signals is less than one-third that of oil signals.

Absolute protection to cars is provided under all conditions, whether the trolley current is on or off.

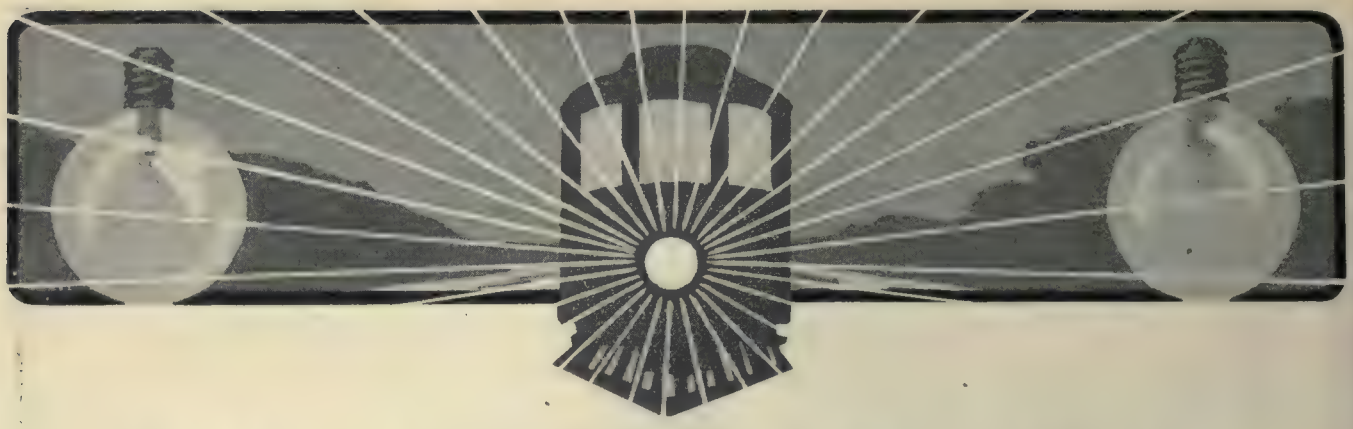
See pages 526-533 of Catalog No. 14 or let us give you details.



O-B Electric Lanterns
No filling—No cleaning. Can't jar out.

The Ohio Brass Company

Mansfield, Ohio



A New Lamp for Headlights
—a "Westinghouse Mazda"

This lamp has a concentrated coiled filament which concentrates the light at the focal point of the reflector—insuring unusual projection.

The coiled filament is the strongest possible construction—especially adapting the lamp to the service for which it is intended.

Made in six sizes to operate directly in circuit with the lamps inside the car.

25 & 36 Watt G-18½ Bulb



One-half actual size

SPECIFICATIONS

Watts	Voltage Range and Average Volts	Type and Size Bulb	Maximum Over All Length, Inches	Base Regularly Supplied	Standard Package Quantity	LIST PRICE Clear	LIST PRICE Bull's Eye Frosted
(*a*)23	105–130	G-18½	3¾	Med. screw	100	$1.25	$1.57
(*a*)36	105–130						
(*b*)46	105–130						
(*a*)56	105–130	G-25	4¾	Med. screw	50	1.50	1.88
(*c*)72	105–130						
(*a*)94	105–130	G-25	4¾	Med. screw	50	2.00	2.50

(*a*) To burn in series with one circuit of regular railway lamps of same wattage rating.
(*b*) To burn in series with two circuits of regular 23 watt railway lamps.
(*c*) To burn in series with two circuits of regular 36 watt railway lamps.

THERE IS A WESTINGHOUSE MAZDA FOR EVERY REQUIREMENT—INSIDE OR OUTSIDE THE CAR—IN THE SHOPS, YARDS AND OFFICES.

46, 56, 72 & 94 Watt G-25 Bulb



One-half actual size

Westinghouse Lamp Company

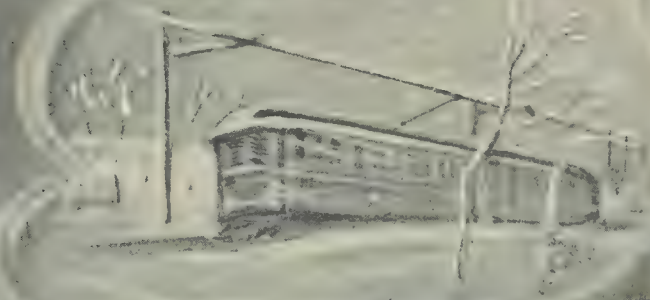
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New Orleans
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Philadelphia
Pittsburgh
Portland
St. Louis
Salt Lake City
San Francisco
Seattle
Syracuse

EXPORT SALES DEPARTMENT—165 Broadway, N. Y.

363

The Name "Westinghouse" is Your Guarantee

"Phono-Electric" Trolley Wire



Schedules Maintained All Along the Line

No matter where your lines may be — in the city or country — the question of service is uppermost in the minds of your patrons.

The most important factor in the accomplishment of the best service is in the installation of a trolley wire that is unusually strong and tough. A trolley wire that will give the longest service life and lowest cost of maintenance.

"Phono-Electric"

will give you long service life. It has more than twice the wearing qualities of hard drawn copper.

It has no hardened surface—is uniform throughout its cross-section.

IT'S TOUGH—saves renewals, and renewals cost money.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.

"Phono-Electric"

Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England



$3384 per Mile Saved

on cost of above track by

INTERNATIONAL STEEL TIE CONSTRUCTION

Read what the road says about it and write for complete data showing savings on FIRST cost as well as maintenance of International Twin Steel Ties over wood tie construction.

THE CITY RAILWAY COMPANY

Dayton, Ohio, March 20, 1914.

The International Steel Tie Company, Cleveland, Ohio
Gentlemen:—(Attention W. P. Day, V. P.)

We are in receipt of your favor of March 13, 1914, with enclosed print number 106, showing steel tie construction as installed by us.

This construction looks very good, and the figures that you have given conform with that which we figure this track cost us compared with wooden tie construction.

We are pleased to say that this track is holding up perfectly, and we believe it is the correct construction where good gravel and a solid subsoil is used.

Your very truly,
THE CITY RAILWAY COMPANY.
(SIGNED) T. E. Howell, Supt.

International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.
Western Eng'g Sales Co., Seattle, Wash. Portland, Ore.
R. J. Cooper Co., Salt Lake City, Utah
J. E. Lewis & Co., Dallas, Texas.
Maurice Joy, Philadelphia.
William H. Ziegler, Minneapolis, Minn.



3

In the interest of the public and good service local transportation should be a monopoly and should be subject to regulation and protection by the state rather than by local authorities.

—From Code of Principles. Adopted by A. E. R. A.

The broader view of electric traction matters secured by the state is practically certain to provide a better guide to what the public and the roads need, than is a narrow, local view.

The broader the viewpoint of all concerned, the better will be the results all around.

This same kind of broad viewpoint in connection with car design is freely at the disposal of all roads which take up the question of

Prepayment Cars

Our nation-wide—even world-wide—experience in designing cars to meet the various conditions existing on our clients' properties has fitted us to act as competent advisers.

Our decade of concentrated thought, our unstinted investment in research and development and our record of achievement insure an ample return for the small charge which we make to those who use the fruit of our labors.

PREPAYMENT CAR SALES COMPANY

A Complete Signal System

It has been announced in various technical journals during the past few weeks that the Simmen Automatic Railway Signal Co. has entered into a license agreement with the General Railway Signal Co., by which the latter has obtained a license to manufacture and sell Simmen Speed Control in the United States.

The Simmen Automatic Railway Signal Co. will continue to sell and install the Simmen System as heretofore, and this company is prepared to give prices on installations of the following systems of the Simmen type:

(a) CONTINUOUS CAB SIGNALS, CENTRAL CONTROL, and AUTOMATIC RECORDING OF TRAIN MOVEMENTS, as now installed on electric lines in the States of Indiana, Minnesota and Tennessee, and in the Province of Ontario.

(b) CONTINUOUS CAB SIGNALS as auxiliary to fixed automatic block signals, either single or double track, steam or electric roads.

(c) CONTINUOUS CAB SIGNALS as auxiliary to manual or controlled manual block with both home and distant indications.

(d) CONTINUOUS CAB SIGNALS operated by continuous track circuit.

(e) The combination of any of the above with THE SIMMEN DISPATCHING SYSTEM, which includes CENTRAL CONTROL OF SIGNALS by means of INTERLOCKED LEVERS and AUTOMATIC RECORDING OF TRAIN MOVEMENTS.

(f) The combination of SIMMEN AUTOMATIC SPEED CONTROL wherever CENTRAL CONTROL OF SIGNALS is used.

THE SIMMEN SYSTEM

P. J. Simmen, Buffalo

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.
TORONTO

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
BUFFALO



Better Business

is here

—*right* NOW

1

This statement is borne out by the books of this company.

2

So far this year we have made and sold more United States Signals than during the last 6 months of 1914.

3

During the first ten days of this month more U. S. Signals were contracted for than during ANY full month of 1914.

4

Indications point to a record month in the history of the

United States Electric Signal Co.
West Newton, Mass.

Foreign Representatives:

Quilliam Brothers, Clegg Court, Chapel Street, Salford, England



Headings of Sections and Sub-Sections

RICHEY'S ELECTRIC RAILWAY HANDBOOK

I. Roadbed and Track

Engineering Costs.
Right of Way.
Grading.
Handling Earthwork.
Power Shovels.
Transportation of Earth.
Culverts, Trestles and Bridges.
Ballast and Ties.
Fences.
Street Railway Roadbed.
Rails; Sections and Composition.
Rail Joints.
Rail Corrugation and Wear.
Track Laying, Bolts, Spikes.
Track Grades and Curves.
Track Special Work.
Electric Track Switches.
Subway and Tunnel Sections.

II. Buildings

Car House Track Layout.
Design of Car House Building.
Fire Protection and Prevention.
Details of Car House Design.
Repair Shop Design.

III. Train Movement

Schedules, Headways, Stops.
Coefficient of Adhesion.
Grades, Actual, Ruling, Virtual.
Train Resistance.
Track Curve Resistance.
Track Grade Resistance.
Acceleration.
Run Curves.
Traction Power Requirements.
Energy Consumption.
Electric Car Tests.

IV. Railway Motors

A. I. E. E. Standardization Rules on Railway Motors.
Preliminary Selection of Motor Rating.
Comparison of Motor Capacity and Service Requirements.
Lists of Commercial Motors.
Characteristic Curves.
Alternating Current Motors.
Gear Ratio Selection.
Ventilation.
Commutator.
Brush Holders.
Brushes.
Commutating Poles.
Armature Maintenance.
Field Coils and Maintenance.
Insulating Materials.
Gears and Pinions.
Bearings and Lubrication.
Motor Suspension and Transmission.

V. Controlling Apparatus

Types of Controllers.
Booster Control.
Resistance Connections.
Commercial Drum-type Controllers.
Resistance Calculations.
Auxiliary Contactors.
Power Operated Control.
Multiple Unit Control.
Field Control.
Alternating Current Motor Control.
Maintenance of Control Apparatus.

VI. Current Collecting Devices

Trolley Wheels.
Trolley Bases.
Trolley Maintenance.
Trolley Pressure.
Third-rail Collectors.
Pantograph and Bow Collectors.
Roller Trollies.
Slot Plows.

VII. Trucks

Classification and Description of Trucks.
Axles.
Wheels.
Wheel Turning, Grinding and Mounting.
Wheel Defects and Inspection.
Standard Wheel Dimensions.
Wheel Base and Track Curves.
Journal Bearings.
Flange Lubrication.

VIII. Braking

Shoe Pressure, Rate and Time of Stop.
Coefficient of Friction between Shoe and Wheel.
Braking Distance.
Hand Brakes vs. Air Brakes.
Weight Transfer in Braking.
Brake-shoe Suspension.
Relation between Air Pressure, Piston Area and Leverage.
Brake Cylinders and Levers.
Clasp Brake.
Automatic Slack Adjuster.
Brake Rigging Calculations.
Hand Brakes, Arrangement and Maintenance.
Straight Air Brake.
Emergency Straight Air Brake.
Automatic Air Brake.
Electro Pneumatic Brake.
Magnetic Brake.
Electric Braking, Regeneration, etc.
Brake Inspection and Maintenance.
Storage Air-brake System.
Air Compressors.
Brake-shoes and Shoe Heads.

IX. Rolling Stock

Car Weights and Operating Costs.
Typical City Cars.
Types of Framing.
Center Entrance Cars.
Articulated Car.
Double-deck Cars.
Storage Battery Cars.
Rapid Transit Cars.
Interurban Cars.
Freight and Express Cars.
Standard Dimensions of Cars.
Height of Car Steps.
Couplers and Draft Rigging.
Train Operation.
Cleaning Cars.
Track Sanders.
Car Heating.
Car Ventilation.
Car Lighting.
Motor Bus Operation.
Electric Locomotives.

X. Transmission and Distribution

Contact Conductor, A. I. E. E., Standardization Rules.
Overhead Trolley Construction.
Catenary Trolley Construction.
Sag and Tension in Span Wire.
Trolley-wire Specifications.
Steel Poles.
Wood Poles.
Concrete Poles.
Transmission-line Construction.
Overhead Crossings of Electric Light and Power Lines.
Galvanizing or Sherardizing Tests.
Terminology Electric Wire and Cable.
Rubber Insulated Wire and Cable.
Weatherproof Braid.
Cable Sheath and Armor.
Paper Insulated Cable.
Tile Duct Conduit Construction.
Third-rail Construction and Material.
Conduit (Slot) Contact Conductor.
Track Bonding.
Electrolysis.
Transmission-line Calculations.
Positive Feeder System and Substation Location.
Feeder Calculations.
Negative Return Systems.
Wire Tables.
Wood Preservation.

XI. Signals and Communication

Block-signal Definitions.
Signal Location and Arrangement.
Signaling Schemes for Suburban and Interurban Service.
Signal Indications, Aspects and Clearances.
Light Signals in Sunlight and Size of Lens.
Block-signal Classification.
Trolley Operated Signals.
Track Circuits.
Dispatchers' Signal Systems.
Signal Maintenance.
Crossing Protection.
Automatic Train Stops.
Telephone Dispatching.
Telephones.
INDEX.

READ THE SPECIAL OFFER ON THE NEXT PAGE

At Last

A real pocket book for the men who Build, Maintain and Operate Electric Railways.

The Special Offer

to Advance Subscribers expires March 10th

Order Today

No longer will it be necessary for the Electric Railway Engineer to equip himself with a battery of pocket books covering Electrical, Mechanical and Civil Engineering.

No longer will it be necessary for him to search through files of periodicals and proceedings for the specific fact, figure or formula for his problem.

Albert S. Richey has prepared a pocket book of over 800 pages, which gives in concise and condensed form all of the tables, formulas and data which the Electric Railway man needs.

Study the contents on the opposite page. Note the broad scope and contents of the book.

You can examine the book before you decide to buy it, if you are a subscriber to the Electric Railway Journal residing in the United States.

Check your preference of the two offers on the coupon and mail it to us today.

Read the full list of Contents on the Opposite Page

McGraw-Hill Book Co., Inc.
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Publishers of Books for Electric Railway Journal



Ready March 10th

By **Albert S. Richey,** Electric Railway Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute.

830 *pages, over* 600 *illustrations, leather, pocket size, full gilt,* $4.00 (*English price* 17*s*), *net postpaid.*

Special price to advance subscribers—$3.50 net, postpaid with your name in gold on the cover free of charge.

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Free examination for 10 days at special price without stamping of name.

SPECIAL OFFER COUPON

McGRAW-HILL BOOK COMPANY, INC.,
239 West 39th St., N. Y. City.

You may enter my order for Richey's "ELECTRIC RAILWAY HANDBOOK" on the offer checked.
....A. At $3.50 with my name stamped in gold on the cover. Print name clearly. Not returnable.
....B. On approval, to be returned or paid for at special rate of $3.50 in 10 days.

Signed

Address

.....E 2-20

If not a subscriber to the Electric Railway Journal, give reference here.



An H-B Life Guard Demonstration

in the Chicago Surface Lines Safety First Campaign

The above photo was loaned us by courtesy of Mr. H. L. Brownell, Safety Inspector of the Chicago Surface Lines. Reproductions of it are being used in the Chicago Surface Lines Safety Publicity Campaign, which Mr. Brownell is ably promoting, to show how street car accidents often befall pedestrians carelessly crossing in front of moving cars.

It well illustrates the important place in life-saving work that H-B LIFE GUARDS play in protecting the Chicago public and the above company. Note that the **instant** the gate struck the man the wheel-guard **dropped.**

Every car operated by the Chicago Surface Lines is equipped with H-B Life Guards. The reason lies in their **efficiency** and **low maintenance.** WRITE FOR SERVICE DATA.

The Consolidated Car Fender Co., Providence, R. I.

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

7257



ARMCO AMERICAN INGOT IRON CULVERTS

The following excerpts are from an article entitled "Corrugated Iron Construction on the Sacramento Valley Irrigation Project" by E. C. Mills, Engineer, published in Engineering News January 22d, 1914:

For permanent construction, the materials used were limited to concrete, either plain or reinforced, and corrugated iron, or to a combination of corrugated iron and concrete. The corrugated iron used was that known to the trade as American Ingot Iron, this having been chosen by reason of its exceptionally high purity. There seems to be no doubt that the principal cause of rusting in iron and steel is its content of substances of different electric potential, and in the case of this metal, the manufacturer's guaranteed analysis, the excellent coating of galvanizing which it carries and the condition of a large number of structures which have already seen quite a period of service were considered sufficient grounds for placing it in the same class with well built concrete in respect to lasting qualities. * * *

The advisability of the employment of corrugated iron for purposes similar to those here described is dependent upon the character of the construction almost as much as upon the grade of the material itself. Hasty and careless work at the pipe factory may involve results which will nullify all the benefits to be derived from a durable metal. The rivets should be of sufficient size and number and, where possible, of the same metal as the remainder of the pipe. Thorough and accurate work in cinching up the sections before riveting makes a decided difference in the strength and serviceability of the conduit. With this material, as with many others, when used in construction of a permanent character, it is economical to pay a price which constitutes a reasonable premium for intelligent work and high standards of commercial policy.

Write the Nearest Manufacturer for particulars and prices on Armco Corrugated Culverts, Siphons, Plates, Sheets, Roofing and Formed Products

Arkansas, Little Rock
Dixie Culvert & Metal Co.

California, Los Angeles
California Corrugated Culvert Co.

California, West Berkeley
California Corrugated Culvert Co.

Colorado, Denver
R. Hardesty Mfg. Co.

Delaware, Clayton
Delaware Metal Culvert Co.

Florida, Jacksonville
Dixie Culvert & Metal Co.

Georgia, Atlanta
Dixie Culvert & Metal Co.

Illinois, Bloomington
Illinois Corrugated Metal Co.

Indiana, Crawfordsville
W. Q. O'Neall Co.

Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.

Kentucky, Louisville
Kentucky Culvert Co.

Louisiana, New Orleans
Dixie Culvert & Metal Co.

Maryland, Havre de Grace
Spencer, J. N.

Massachusetts, Palmer
New England Metal Culvert Co.

Michigan, Bark River
Bark River Bridge & Culvert Co.

Michigan, Lansing
Michigan Bridge & Pipe Co.

Minnesota, Minneapolis
Lyle Corrugated Culvert Co.

Minnesota, Lyle
Lyle Corrugated Culvert Co.

Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.

Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.

Nevada, Reno
Nevada Metal Mfg. Co.

New Hampshire, Nashua
North-East Metal Culvert Co.

New Jersey, Flemington
Pennsylvania Metal Culvert Co.

New York, Auburn
Pennsylvania Metal Culvert Co.

North Carolina, Greensboro
Dixie Culvert & Metal Co.

North Dakota, Wahpeton
Northwestern Sheet & Iron Works

Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.

Oklahoma, Shawnee
Dixie Culvert & Metal Co.

Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.

South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.

Tennessee, Nashville
Tennessee Metal Culvert Co.

Texas, Dallas
Atlas Metal Works

Texas, El Paso
Western Metal Mfg. Co.

Texas, Houston
Lone Star Culvert Co.

Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.

Virginia, Roanoke
Virginia Metal Culvert Co.

Washington, Spokane
Spokane Cor. Culvert & Tank Co.

Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.



Get Your Millions

spent annually for e

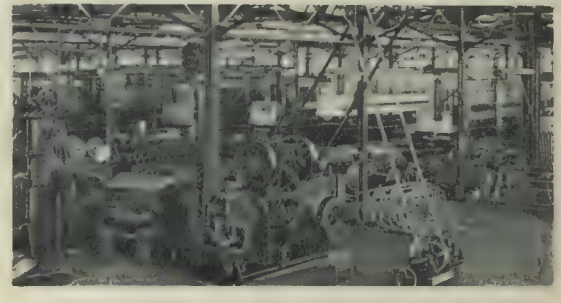
Regardless of business conditions, maintenance of equipment such as illustrated must go on wherever electric railway cars operate.

It is a necessary part of operation.

Fifty-five million dollars is spent annually by electric railways for maintenance.

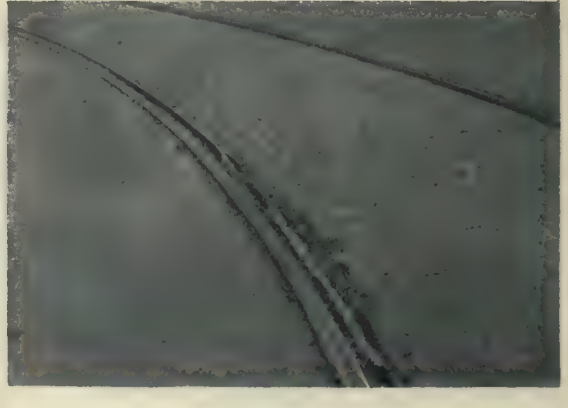
The bulk of this maintenance work must start in the spring—so that electric railway men are now seeking information about anything that will help them toward efficiency and economy in making purchases for this work.

And this year as in past years they will eagerly welcome Electric Railway Journal's Annual Maintenance Number. It is their buying guide. Its advertising pages show what's on the market. That is why this issue has always been welcomed by manufacturers of electric railway materials as an opportunity to present and drive home their selling arguments.



Electric Railway Journal is received and read each week by 95.3% of the roads in the field, which operate and maintain 99.3% of the existing rolling stock.







Get Stro

Annual Maintenan

Electric Railway Journ

Memb

Share of the
f Dollars

c railway maintenance







Electric Railway Journal is received and read each week by 95.3% of the roads in the field, which operate over 98.8% of the total mileage of the industry.

This year's opportunity, the 1915 Annual Maintenance Number, will be issued March 20.

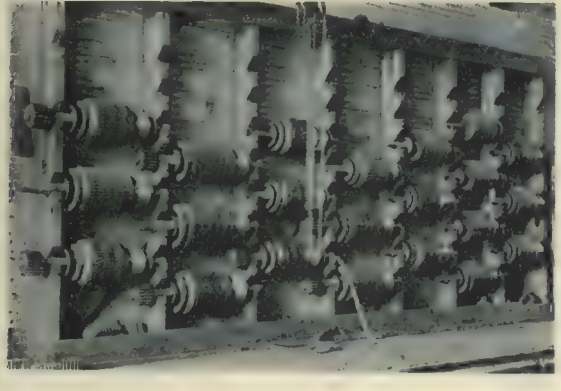
The text pages will be devoted primarily to this live subject of maintenance work. Shop methods, descriptive articles featuring phases of maintenance work, helpful editorial articles—all tending further to intensify the interest in maintaining equipment in prime condition—all tending toward more active buying for buildings, power houses and substations, rolling stock, overhead and track.

Make your advertising story a part of this big, helpful, interesting and timely issue.

There is just enough time left to prepare an attractive advertisement for this issue.

Our service department will help.

Write us today, and insure a strong position for your announcement.

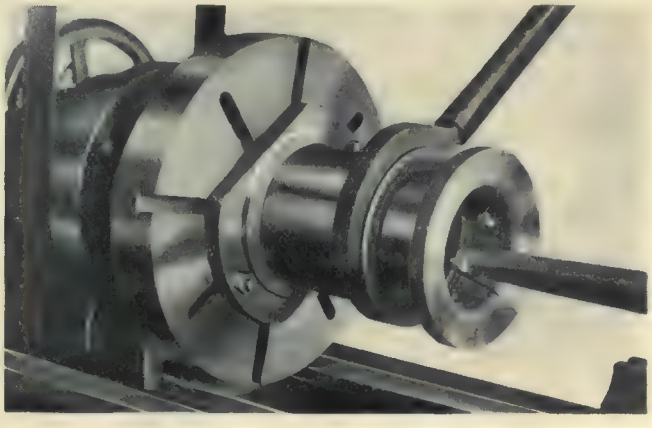


epresentation
h

umber—March 20th

t 39th St., New York

u of Circulations



SAFETY FIRST

A Collision —The Result

Running at full speed (60 miles an hour) Coach No. 25 ran smack into Traction Engine stalled on the tracks. What happened is most convincingly told in the accompanying illustrations.



THE COACH. Not a Passenger Injured. Damage to Coach Infinitesimal.



THE ENGINE.

Most gratifying to the Designer and to the Builder of the 61-ft. Steel Coach.

SAFETY FIRST

ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:
WENDELL & MacDUFFIE CO.
61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

The Claim Agent's Best Friend



Oscillating blades which keep swinging until the train has passed; a night illuminated warning; a loud-voiced locomotive bell, with a peremptory note that can be heard above the noise of automobile traffic; a mechanism that needs no bond wires, track circuits or delicate apparatus—these are the strong features that have made the HOESCHEN HIGHWAY CROSSING SIGNAL the backbone of the "Safety First" movement.

HOESCHEN Highway Crossing Signal

Does not interfere with track circuits and is not operated by trolley current. Free from electrical troubles.

The bell is started, stopped and wound by the movement of the car wheels over the track. The bell is connected by a metallic circuit with magneto generator which is operated by means of an arm clamped rigidly to the base of the rail. A slight lateral movement of the rail head, caused by the pressure of the wheels of train passing over it, is multiplied many times at the outer or free end of the arm. This operates the generator. Installed on more than 100 steam and electric railroads in America and abroad.

Write for Descriptive Matter and Photographs

Hoeschen Mfg. Company
Omaha, Neb.

Where Poles are Heavily Loaded

Diamond construction is *safety* construction. There is no possibility of a Diamond Pole telescoping, the joints are longitudinal. The design allows the greatest distortion without danger of permanent set.

DIAMOND Tapered Steel Poles

are of uniform strength the entire length. They are watertight, light weight and the tapered design makes the fittings proof against slipping. Particularly recommended for modern high tension service.

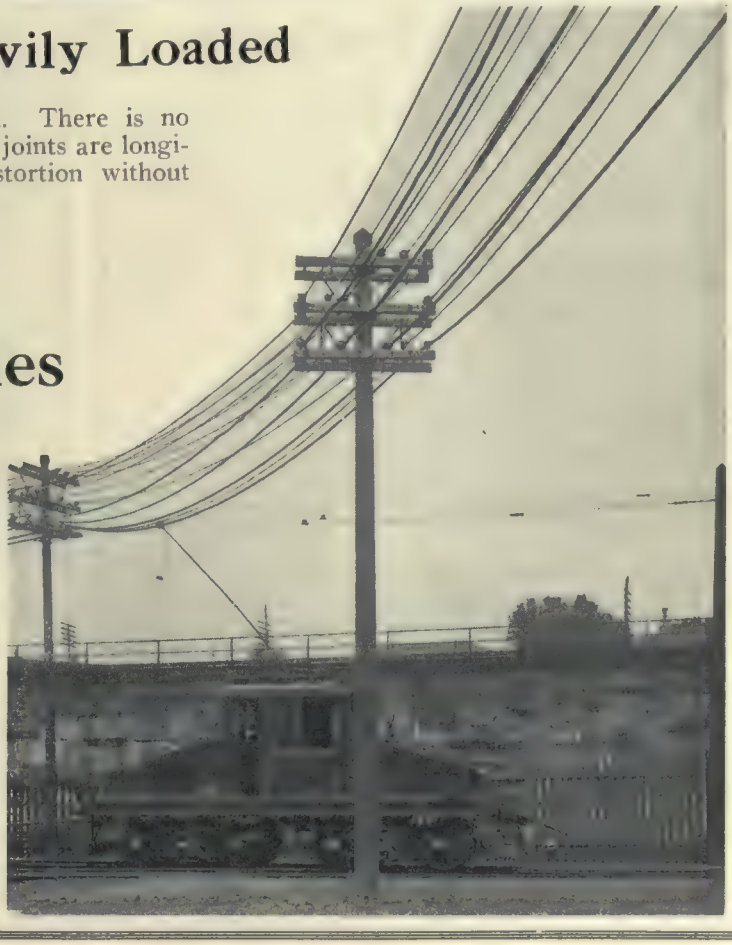
Write for full data.

Diamond Steel Pole Co.

Philadelphia

Pa.

9194





"All along our lines"

said the chief dispatcher, "you will find our road-men—conductors, inspectors and construction foremen—carrying

Western Electric Portable Telephones

as a part of their regular equipment.

The portables have prevented a great many expensive delays and some possible accidents simply by giving our men a means of getting in touch with the division dispatcher from any point on the road. They're worth their weight in gold."

Write for prices of our various types of portables.

Western Electric Company

Manufacturers of the 8,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco
Buffalo	Richmond	Milwaukee	Omaha	Oakland
Philadelphia	Savannah	Indianapolis	Oklahoma City	Los Angeles
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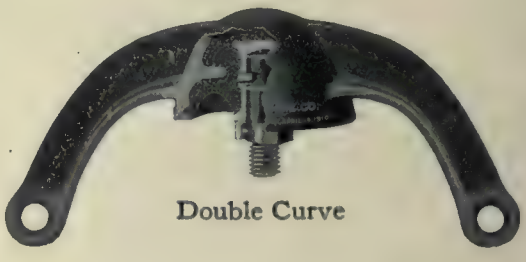
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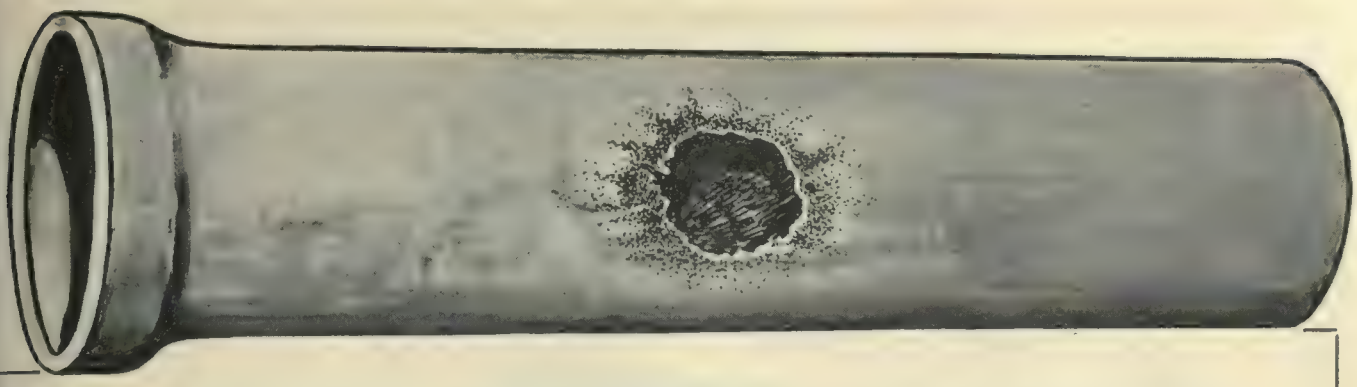
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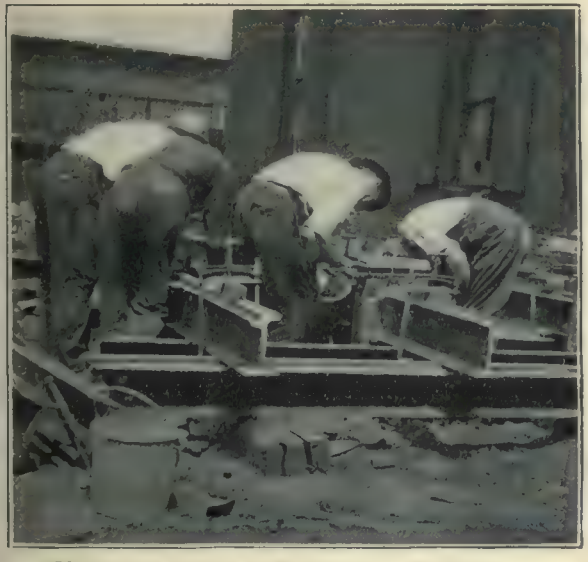
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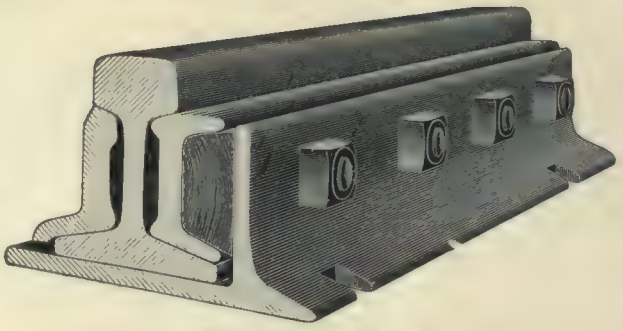
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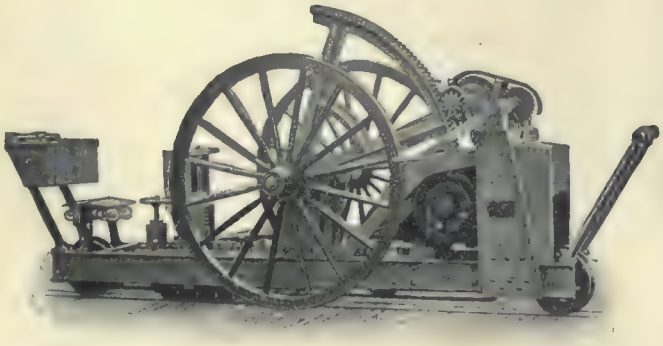
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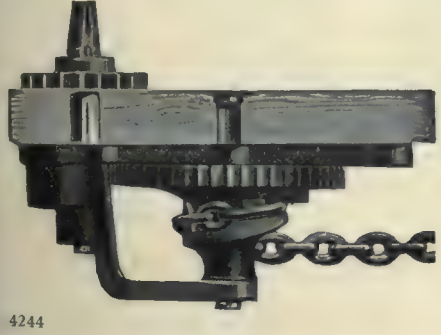
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5305

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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THE STATUS OF THE ENGINEER

It was a notable group of engineers that gathered on the auditorium platform at the home of the United Engineering Societies in New York last Wednesday evening to define the status of the engineer and to suggest means for improving it. The group included the presidents of two great electrical manufacturing companies, a chief telephone engineer and four past presidents of the electrical, civil and mechanical national societies, all prominent in their respective fields and two of them also as educators. Surely the composite picture drawn by these men without collaboration ought to be worth more than a passing glance. To epitomize our impressions of the picture it can be said first that the engineer as a man is more important than the engineer as a technician. It was clearly shown that the nature of engineering compels accuracy and honesty in all technical matters and this fact produces the same qualities in the engineer's character; that no amount of specious argument can offset the inexorable test of the laws of nature. But the status, or reputation of the engineer depends partly upon his personal qualities, largely inherited, and partly upon his activity in taking a practical interest in the large problems of his community and his profession. To be of benefit to the auditor a pronouncement like that of the A. I. E. E. symposium must suggest action. The practicable and desirable thing for the conscientious engineer to do is, by introspection, to determine whether or not he is doing what he can personally to enhance the reputation of the profession as a body of effective citizens and then to map out his course by the result.

REGULATION FOR THE JITNEY BUS

One feature of the jitney bus situation that stands out above all others is the need for regulation. Primarily the new conveyance aims only at competition with the much-regulated street railway for the cream of its traffic—a fact borne out by the naïve testimony of a jitney operator in one of the western cities to the effect that he couldn't operate on streets other than those occupied by railway tracks because he could keep his car full only by picking up groups of people who were waiting for the street cars. From the standpoint of ethics it is manifestly impossible to enforce the principle of regulation for the electric railway and to permit its competitor to go free of all restraint. Unfortunately, however, ethics are frequently a poor basis for argument, and regulation of the jitney, at least during its early stages, will probably come about not so much through a spirit of fair play as through the realization by the affected cities that the advent of the unrestricted jitney involves more direct dangers to the community than the abandonment of outlying and unprofitable electric railway lines. Already reports of extreme vehicular congestion are heard from the western towns where appreciable numbers of jitneys are operating, and fatalities to pedestrians struck by the recklessly driven vehicles have brought home generally the need for imposing responsibility by means of indemnity bonds. This matter is a serious one for every citizen to consider. If a man is injured while on the public thoroughfares he can look for damages only to the owner of the vehicle that hits him, and if the owner's only asset is a second-hand automobile, the victim is not likely to be well compensated. This is a point which might well be emphasized in communities where the advent of the jitney has been hailed as a complete solution for the transportation problem. Another is that, to the jitney, a schedule has not even the value of a "scrap of paper," one driver admitting with perfect frankness that he never completed his advertised route in rush-hours because it wasn't profitable.

WORDING OF NOTICES TO THE PUBLIC

The use of public notices on railway property is essential to safe and expeditious service. The wording of these often leaves much to be desired. "This way out," "Leave by the front door," "Keep to the right," etc., do not necessarily indicate curtness in the attitude of the management, but patrons would be better pleased, unconsciously perhaps, if the signs were more diplomatically worded. If brevity is sought a simple notice, "Entrance" or "Exit," answers the same purpose and cannot offend the most peevish passenger. The liberal use of the word "please" in the proper places involves little extra cost for lettering and is an effective lubricant in eliminating friction in the contact between management and public. The term "proper places" was used advisedly above. There are signboards upon which it would be out of place or incongruous. "Look out for the locomotive" is none too curt to startle the heedless pedestrian—it suggests the imperativeness of appropriate action. "Watch your step" would be weakened by "politeness." The criterion for notice wording appears to be this: Where the patron is asked to do a favor for the convenience of the company and his fellows a notice should be phrased much as a verbal request would be, with due allowance for brevity. Where the favor is to the passenger, particularly if it relates to his safety, the wording should be chosen primarily on the basis of securing attention. Harshness in an automobile horn is justified, but there are places where deference is preferable to emphasis.

THE COMPANY SECTION AND INDIVIDUALISM

We have discussed various phases of the company-section movement, but one point which has not been mentioned is the development of the individual employee. After such a section has been organized, experience shows that a great many surprises in the form of latent ability will be discovered, the reason being that hitherto there had been no channel through which it could express itself. In a large industry like electric traction in this country, it is of the utmost importance that the prudent managers or department heads surround themselves with efficient assistants. Moreover, these understudies should be selected from the ranks rather than from outside sources, because of the moral effect such a plan will produce. Some railways have been averse to publicity in any form, and this policy has tended to suppress individualism among the employees. But the company-section movement encourages these employees, especially among the younger men, who have ideas which may be of help to the company, to demonstrate their ability to solve difficult service problems. Many instances, no doubt, can be recalled where employees have shown an inaptitude for certain work, but a change in their duties has revealed unlimited capacity. The broad policy of showing no favoritism in the company-section work is also certain to result in improvement in the personnel of any organization. Other opportunities assisting in this development present themselves from time to time, and the individual employee should be encouraged by and under the direction of his superior to take advantage of every occasion.

SUGGESTED CHANGES IN THE CODE

An extended discussion of the code of principles, written by Oscar T. Crosby, is published elsewhere in this issue in the form of a letter to the editors. Although we do not agree with all of the author's contentions, we are glad to give space to this communication, partly because of Mr. Crosby's attainments and service in the field, and partly because we consider with Mr. Crosby that the JOURNAL should be the forum where those who wish to better the conditions in the industry should have an opportunity to express their views, whether or not these views coincide with those of the editors. Again, some of the changes suggested by Mr. Crosby, perhaps all of them, may have occurred to others, and it is well to have expression given to them so that they can be analyzed and discussed. Before taking up the suggestions in detail, however, it is well to state that in the present code, as we understand it, brevity was considered one of the essentials. The purposes for which it was intended necessitated that it should be kept within small compass. This made it impossible for the committee to expand on any of the principles and give the reasons for the wording used.

Mr. Crosby's objections to the code are principally on two points. The first of these is in regard to the return which a public utility should be allowed to earn. The second is in regard to labor disputes. These two points will be considered in their order.

The code says that in an appraisal of an electric railway for the purpose of determining reasonable rates all methods of valuation should have due consideration. This means, as Mr. McCarter explained in our issue of Nov. 7, a consideration of the investment, the reproduction cost new, the amount and market value of the stocks and bonds, the going concern value and all intangible elements which have served to bring the physical property and the business of the company to its present state of development. After this is done, and the rate for service to give a fair return on the value so obtained, all things considered, is found to be abnormally high, it may properly be reduced, but if found to be abnormally low it should be raised. Mr. Crosby, on the other hand, believes that where a specific charge for service has been agreed to, the railway and the public should stand or fall by that. Where no specific service charge appears in the contract, he says: "The investor is not to be forced into loss by arbitrary exercise of power in fixing rates."

The discussion, therefore, centers largely, as we understand it, on the case where there is a specific charge for service, such as exists on most city lines. Is it for the benefit of the public and the public utility that this rate should be always fixed, for eternity in the case of a perpetual franchise, or should either side under restrictions be able to petition for a change in the rate? Again, are there not precedents to show that the public, acting through the legislature or other authoritative body, will reduce rates for public utility service when they are abnormally high? If this is being done where the rates are high, or are considered to be so by the public, should not the public utility make the claim that the opposite should prevail and its rates should be increased when they are abnormally low?

The idea of a flexible charge for public utility service, depending on the rate of return earned by the public utility and the quality of service, is comparatively new, and the argument has been made that it is theoretically unsound because it is equivalent to a guaranteed return on the capitalization of the public utility, irrespective of the quality of its management. We think this claim is incorrect. But if the state is to exercise authority over rates for service, as it seems disposed to do and practically has to do on account of the monopolistic character of public utility service, it can take into consideration the questions of management, capitalization, return requisite to attract new capital, etc., in establishing its service rates. Under such a system there would be fewer bonanzas and fewer bankruptcies among public utilities than under the "common law" system of free competition and rates which the traffic will bear. But for good or evil, the former times when the public utilities could be conducted with the same freedom from restraint as a private business have passed. The present plan of state control of rates and service may not be the ideal system, but it at least is better for the community as well as the companies than municipal ownership, which seems now practically the only alternative. For these

reasons we prefer the thought as expressed in the code on this point to Mr. Crosby's proposed substitute.

Let us pass now to the criticism of Mr. Crosby upon the seventh principle, which is the one on labor. We think that there is a difference in meaning which is an essential one between the principle as it appears in the code and the wording suggested by Mr. Crosby. Mr. Crosby's principle reads: "Electric railway companies, being public servants regulated by public authorities, should be protected from all forms of violence or intimidation during strikes." This, of course, is entirely proper, but protection against violence or intimidation is a kind of protection to which every employer of labor is entitled. The code goes further than this and says that owing to its public character an electric railway company is entitled to something more, just what it does not state, but this added protection may be simply a sympathetic public opinion. As Mr. McCarter said in his article in our issue for November 7, "a strike among the employees of such a railway company should be regarded with as much public disfavor as a strike in the police department of the municipality." Owing to the public character of his services the railway employee should recognize a duty to the public as well as to his employer and take a justifiable pride in it. As it reads, the code does not require the service to be put upon a military basis nor does it recommend any interference with an employee's freedom to stop work in a reasonable manner.

Mr. Crosby concludes his letter with the suggestion that before any changes are introduced in the code an endeavor should be made to interest other public utilities in the adoption of a standard set of principles applying to all. To this proposal that the other classes of utilities should co-operate in formulating the "rules of the game," as described by President Wilson, there can be no dissent. Such a plan should greatly help in clarifying public opinion in this important matter. But as the electric railway companies have formulated a code applicable in principle to any class of utility and as none of the other interests has drafted any similar statement, so far as we know, it seems to us that the present electric railway code could well be used as a basis for such a standard code, or even adopted in toto, with such changes in wording as are required to make it apply to public utilities in general.

A RATIONAL UNIT FOR STEAM BOILER RATING

Our esteemed contemporary, *Power*, has taken rather an iconoclastic stand in regard to the method of rating boilers which has been recently suggested by *The Locomotive*, whereby the anomalous "boiler horse-power" may be replaced by the more rational unit, heating surface. Of course, every one admits the inadequacy of the boiler horse-power as a convenient or even intelligible term. In fact, it was admittedly misnamed when it was originated some forty years ago as an arbitrary basis for comparison in the famous boiler tests at the Centennial Exposition, and it has held on, in spite of its limitations, merely because of the lack of attention that has been devoted to getting something better.

Apparently the difficulty that stands in the way of any change is the fact that the boiler instead of the furnace is almost invariably considered as the productive unit. The very acceptance of a unit of boiler output on a power basis shows that fact beyond a doubt, and it is obvious that in the minds of engineers generally the true meanings of the terms boiler, heating surface, and furnace are inextricably confused. For example, take the case of the description of a plant with 300-hp boilers, as cited by our contemporary, and assume that the data about the so-called boiler output are worth mentioning. If the plant has a 150-ft. stack and Roney stokers, each boiler will do well to make 9000 lb. of steam per hour, but if forced-draft, underfeed stokers are installed under the same boilers, is there any doubt that each can evaporate 27,000 lb. of water? Just what difference does the size of the boiler make, except to a boiler expert? Is not the stoker the important feature? Here is a case where the same boiler might have two perfectly legitimate but widely different ratings if the fallacy of measuring boiler output is persisted in. How much simpler it would be to rate the stokers!

As a matter of fact, the ultimate ability of boiler heating surface to transfer heat has not even been approached in stationary practice, and within limits that are far beyond anything that is now considered permissible, the whole matter of output and practically the whole matter of economy rests directly upon the furnace or stoker. Before the recent years of scientific stoker operation we were all obsessed with the idea that the extent of heating surface had a vast influence upon economy, but now that the principle of reduced excess air is understood, it is recognized that the admission of a few more pounds of air than are needed to burn the coal will have far more influence upon the coal pile than any reasonable increase in the rate of driving.

The heating surface—a term which is frequently considered to be synonymous with "boiler"—is merely a means for transmitting the energy, or heat that is liberated by the stoker, into a form that is available for use. It would be quite as reasonable to rate steam piping on a horse-power basis as it is to speak of boiler output in terms of horse-power, unless, perchance, the term boiler was intended to mean furnace. The piping transmits heat in the form of steam between the water in the boiler and the prime mover, and the duty of the heating surface is no whit different in principle when it transfers heat between the furnace and the water.

When a boiler is bought, the purchaser gets heating surface, which is nothing but a means for heat transfer, and what he obtains from this heating surface in the way of heat transferred will depend solely upon himself. If he is up to date he will use the boiler in connection with a modern stoker and will get 10 lb. of steam or more from each square foot. If he is somewhat behind the procession he will only get 3 lb. Manifestly the measure by which he should buy is heating surface, because that is the practical measure of the cost of boiler construction.

Front Entrance, Center-Exit Car for Cleveland

This New Semi-Steel Car, Which Is Designed Especially for Crosstown Service, Combines the Principles of the Near-Side and Center-Entrance Types, and also the Pay-As-You-Leave and Pay-As-You-Enter Systems of Fare Collection

The most recent experiment in car-body arrangement is the Cleveland Railway's new combination near-side-entrance, center-exit, pay-as-you-leave car for crosstown line service. In this car there are longitudinal seats in the front half of the body, and the fare box is located beside the center-exit doors, so that the front entrance loading area embraces practically one-half of the car body in addition to the vestibule. Practically speaking, the arrangement is expected to permit loading the maximum number of passengers found at any transfer point without the delay incident to collecting fares on the platform. At the same time the usual jostling of ingoing and outgoing passengers on center-entrance cars is eliminated, while the center-exit assures quick alighting. Loading at the front end also is advantageous, because the boarding passengers are under the surveillance of the motorman.



CLEVELAND CROSSTOWN CAR—GENERAL VIEW OF CAR

Dimensions and Weights of Cleveland Car

Length over bumpers	51 ft. 1 5/16 in.
Length over corner posts	40 ft. 4¾ in.
Truck centers	29 ft. 1 in.
Wheelbase	4 ft. 10 in.
Floor to rail	32 in.
Width over side plates	8 ft. 2 in.
Width over belt rail	8 ft. 4¾ in.
Height inside	8 ft.
Height of exit doors	7 ft. 2¾ in.
Height of entrance doors	6 ft. 4¾ in.
Step heights front vestibule	12—11—9 in.
Step heights center entrance	12¾—9⅝—9⅝ in.
Passengers seated in summer	56
Passengers seated in winter	55
Passengers standing	77
Total passenger load	133
Weight of body with accessories	27,590 lb.
Trucks	5,300 lb.
Air-brake equipment	1,826 lb.
Motors	9,600 lb.
Control	1,300 lb.
Total weight completely equipped	45,616 lb.

The car was designed especially for crosstown-line service, and if the experiment proves successful other cars of this type will be built in the near future. The necessity for it is found in the fact that, in Cleveland, some of the crosstown lines intersect as many as twelve main trunk lines within a distance of less than 3 miles, and this makes transferring passengers the principal business of the crosstown lines. The character of this service involves the movement of a large number of passengers at each transfer point, and it is important that they should be encouraged to move quickly.

Since all stops on crosstown lines are on the near side, the reason for the adoption of the front-end entrance is obvious. Past experience also has shown that, even with the roomy platforms as are used on Cleveland cars, the number of transfer passengers picked up at any intersection is so large that they cannot be handled without considerable delay. However, with the enlarged loading area provided by the pay-as-you-leave system that is applied to the front half of the new car, it is believed that this delay will be obviated.

Features of Design

The new car, like most cars in Cleveland, is equipped for single-end operation. Its construction is semi-steel, and it is practically similar to that of the Cleveland center-entrance motor cars, which were described in the



CLEVELAND CROSSTOWN CAR—VIEW OF CENTER EXIT



CLEVELAND CROSSTOWN CAR—INTERIOR VIEW LOOKING TO FRONT PLATFORM



CLEVELAND CROSSTOWN CAR—INTERIOR VIEW LOOKING TO REAR

ELECTRIC RAILWAY JOURNAL of Feb. 28, 1914, on page 455, the only modifications being to make the body floor continuous from the front to the rear by the elimination of the center-entrance well and to provide for a front platform. The table on the opposite page gives general dimensions and weights.

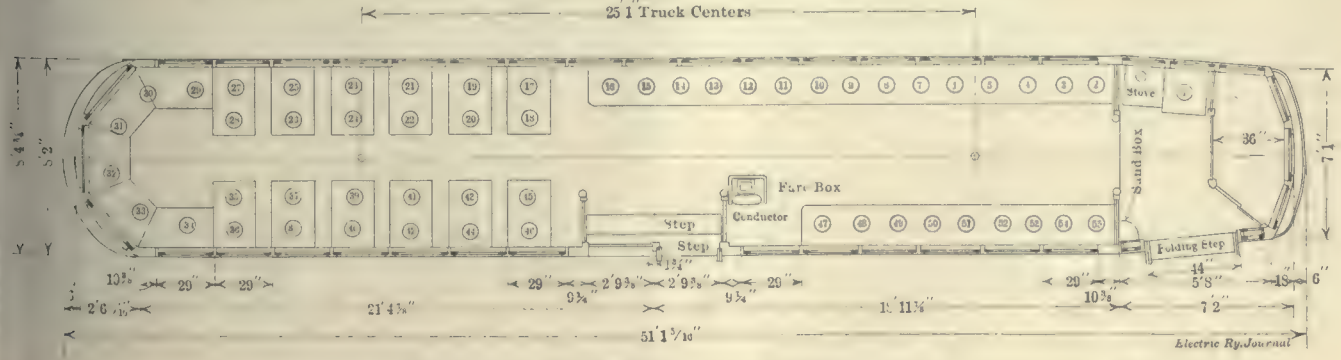
The clear width of the front entrance with the folding doors open is approximately 40 in., and this is sufficient to permit two passengers abreast to board at one time. Stanchions flanking each side of this opening are installed to encourage the rapid movement of passengers in boarding the car. The 10-in. step from the front platform to the car body floor is flanked by two pipe stanchions which, in addition, protect the feet of passengers seated on the longitudinal seats. All pipe stanchions are white enameled.

The clear width of each of the two center-exit doors is 33⅜ in. Stanchions on each side of this opening and one at the center are installed on the second step, while two more stanchions are located inside the car. Two-leaf folding doors are used instead of the sliding doors employed on the Cleveland center-entrance motor cars. In the open position these occupy a portion of the available entrance and exit width, but the clear openings are still ample for the free movement of passengers. At the same time the use of this style of door eliminates the usual complications incident to providing sliding-door pockets in the side of the car, which, in the center-entrance motor car, were in the panel separating the two door openings. In the new car, of course, the panel between the center doors is unnecessary.

Seats for fifty-six passengers are provided in summer and for fifty-five in winter, two of these occupying space immediately to the rear of the motorman's cab on the front platform. In winter one of the platform seats is removed, the space being occupied by a Peter Smith heater. The motorman is inclosed in a small cab with windows on all sides. Partly as a means for getting passengers to occupy the rear of the car twelve cross-seats and a semicircular seat in the rear vestibule were provided, as it was believed that the passengers would avail themselves of vacant seats in the rear end of the car before the longitudinal seats would be occupied.

METHOD OF COLLECTING FARES

All passengers availing themselves of the seats in the rear of the car pay their fares as they move by the conductor's stand. Passengers remaining in the front half of the car and occupying the longitudinal seats, however, are not required to pay their fares until they approach the center-exit doors to alight. In consequence, all the advantage of the center-entrance car in shortening the movements of alighting passengers is afforded, and an increased loading area is provided, thus tending to eliminate congestion incident to collecting fares at the entrance. A hand-rail, in place of the usual hand-straps, has been provided at a convenient height over the longitudinal seats in the front half of the car body. The brackets supporting the hand-rail, as well as the other car hardware, are made of Aero metal—a new light-weight, high-strength alloy which recently has been placed on the market by the Garford Engineering Company, Elyria, Ohio, through its selling agents, the Ellcon Company, New York.



CLEVELAND CROSSTOWN CAR—SEATING PLAN

EQUIPMENT

By a combination of the Peter Smith Heater Company's forced hot-air heater and the Scullin exhaust ventilator, which takes the form of a dummy monitor on the arch-roof car, with louvres along its sides and grated, circular ventilator openings in the car-body ceiling, ample ventilation is assured. The scheme of artificial illumination that is used is the result of exhaustive tests conducted by Mr. Scullin, being similar to that adopted for the Cleveland center-entrance motor cars. The lighting system includes five 92-watt Mazda lamps in series. These lamps are fitted with Alba shades and are mounted in the headlining along the center line of the car. A sixth, or spare, lamp is so connected with a selector switch that it can be instantly cut into the circuit in case of failure of any one of the five lamps regularly lighted. In addition to these lamps for general illumination, five 23-watt tungsten lamps are also used, one on the front platform, one over the fare-box, one in the headlight and two in the destination sign.

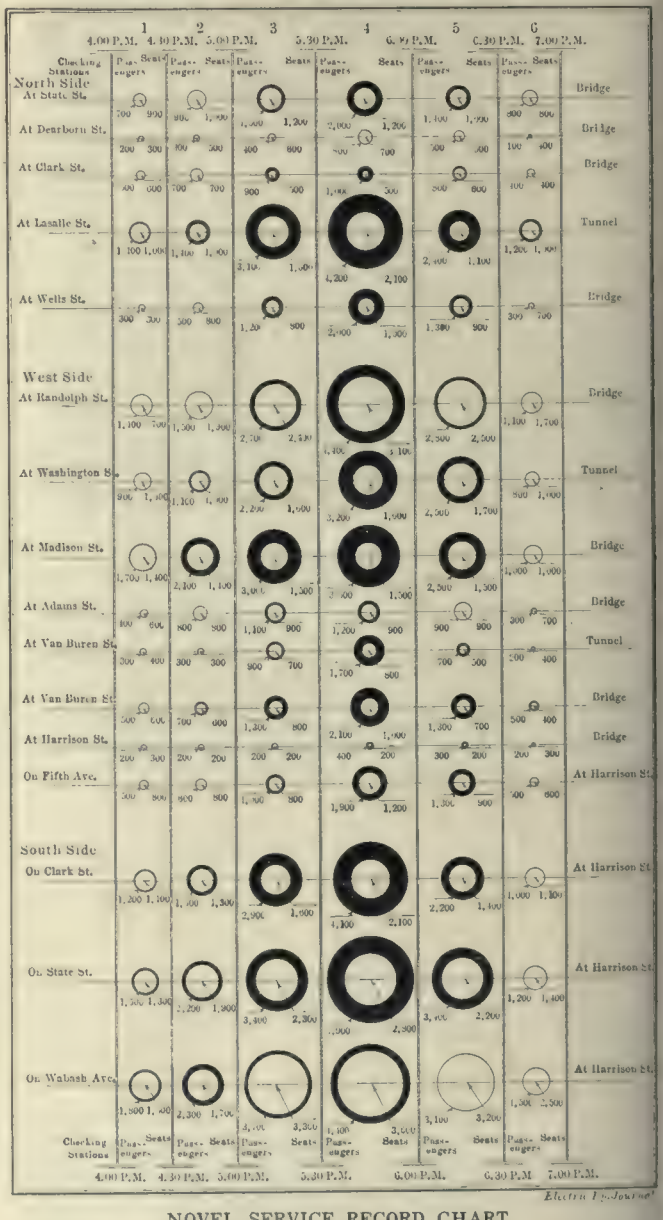
This car body is mounted on two Brill 51-E-1 trucks with 26-in. wheels. Each truck carries two Westinghouse, No. 340, 40-hp, 550-volt commutating-pole motors with PK control. This type of motor was selected because it was well adapted to low-floor cars where wheels smaller than 33 in. were used. The motor equipment is also exactly like that used on the center-entrance motor cars, but the adoption of the PK control is new, the advantages claimed for it being the removal from the car platform of all heavy current-carrying parts, thus eliminating controller burnouts and circuit-breaker flashes, and at the same time providing increased platform space through the use of a small master controller. It was described in full in the ELECTRIC RAILWAY JOURNAL for Nov. 28, 1914.

The novel combination of passenger-interchange facilities and fare-payment systems imbodied in the new car should be credited to Peter Witt, street railway commissioner, Cleveland. The experimental car itself was designed and built in the shops of the Cleveland Railway Company under the supervision of Terrance Scullin, master mechanic.

A Novel Service Record Chart

From time to time engineers making service checks are confronted with the problem of putting these checks in such form as to make them readily understandable to the layman. In its effort to accomplish this end, R. F. Kelker, Jr., in charge of the transportation bureau of Chicago's Department of Public Service, has devised a service record chart which at once indicates to the alderman the service condition existing at certain fixed points during certain periods of the day. As shown in the accompanying illustration of one of these charts, which was originally designed to show in a comparative form a record of the number of seats offered and the number of passengers on the car, the white space in the center of each ring represents the number of seats, and the black area surrounding it shows the number of passengers standing.

While this chart does not show the instantaneous peaks at any one period, it does indicate the average number of seats offered to the total number of passengers during any half hour between 4 o'clock p. m. and 7 o'clock p. m., which comprises the evening rush period. In addition to the diagrammatic indications, the actual number of seats offered and the total number of passengers carried are also shown in figures. The circles on each horizontal line show the condition at any single checking station for each of the half-hour periods, and the circles in the vertical columns show, comparatively, the character of service rendered in each period at each checking station. Many other interesting comparisons may be made from a study of this chart, such as the maximum number of passengers carried in the maximum half hour, the minimum number of passengers carried in the minimum half hour, the minimum and maximum traffic checking points, and as the comparative service offered at the different checking points.



NOVEL SERVICE RECORD CHART

C. A. Reynolds, chairman of the Public Service Commission of the State of Washington, has announced that the board will organize a department to handle all complaints relative to service. According to Mr. Reynolds, the distance between the city in which the complaint arises and the city in which the office of the commission is located frequently precludes the possibility of immediate attention. Complaint branches have already been established in Spokane, Everett, Seattle and Tacoma.

The Pueblo *Star-Journal* in a recent industrial edition devoted nearly a page to an illustrated description of the electrical and street railway properties of the Arkansas Valley Railway Light & Power Company which serves Pueblo, Colorado, the Cripple Creek mining district, Canon City and the Arkansas Valley agricultural district between Pueblo and La Junta.

Results Obtained by Instruction Department New York State Railways, Rochester Lines

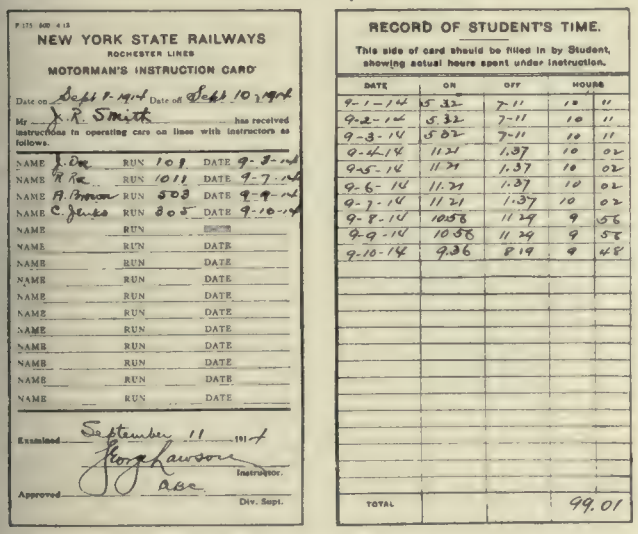
The Author Describes the Methods of Instruction Employed and the Remarkable Reduction in Number of Accidents Secured by Concentration of Effort on Instruction of New Platform Men

BY GEORGE LAWSON, SUPERVISOR EMPLOYMENT AND INSTRUCTION

A brief description of the instruction department of the New York State Railways, Rochester lines, appeared in the ELECTRIC RAILWAY JOURNAL for Dec. 2, 1913. The results obtained since July, 1913, are given in this article, with further details of the methods used in instructing and recording the work of new men.

INSTRUCTION METHODS

Men are employed for the train service between 8 a. m. and 10 a. m. daily except Saturday, by the supervisor of employment and instruction. After filling out the necessary application blanks, they are taken out on an instruction car operated over some 2000 ft. of track that has been laid for this purpose in the Blossom Road yards of the company. This car is used in regular service, and



NEW YORK STATE RAILWAYS
ROCHESTER LINES
MOTORMAN'S INSTRUCTION CARD

Date on Sept 9-1914 Date off Sept 10 1914

Mr. J. R. Smith has received instructions in operating cars on lines with instructors as follows.

NAME	RUN	DATE
J. Doe	109	9-8-14
W. Roe	1011	9-7-14
A. Brown	503	9-9-14
C. Jones	805	9-10-14
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE
NAME	RUN	DATE

Examined September 11 1914
George Lawson Instructor.
Approved ABe Div. Supt.

RECORD OF STUDENT'S TIME.

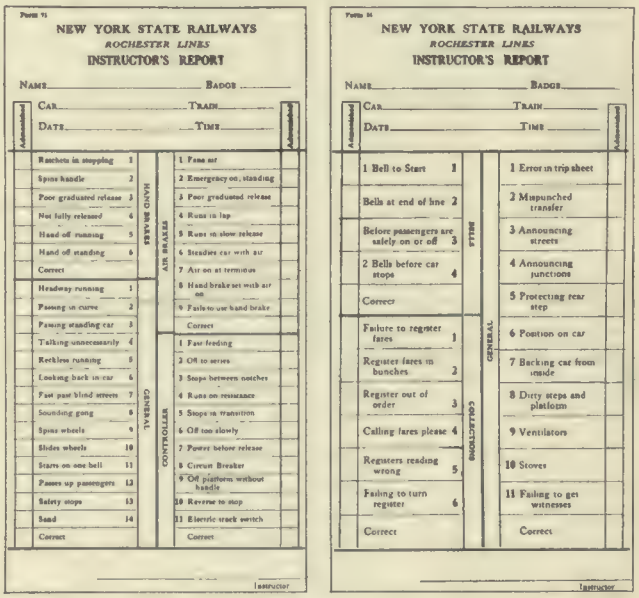
This side of card should be filled in by Student, showing actual hours spent under instruction.

DATE	ON	OFF	HOURS	
9-1-14	5 32	7-11	10	11
9-2-14	5 32	7-11	10	11
9-3-14	5 02	7-11	10	11
9-4-14	11 31	1.37	10	02
9-5-14	11 31	1.37	10	02
9-6-14	11 31	1.37	10	02
9-7-14	11 21	1.37	10	02
9-8-14	1058	11 29	9	56
9-9-14	1058	11 29	9	55
9-10-14	9.36	8 19	9	48
TOTAL			99.01	

differs in no way from others of the same type except that it is equipped with an air brake in addition to the hand brake. Along the instruction track are found the usual signs used throughout the system, such as passenger stop, circuit breaker and safety stop signs, with which the student thus becomes familiar.

Students are given one or two hours' practice on this car under the supervision of the traveling instructors and are then sent to the company's doctor for medical examination. After passing the doctor they are sent to the divisions to which they have been assigned, where they present to the station master the instruction card shown in an accompanying illustration. On this card is kept the record of the men with whom the student breaks in on each line, and the number of hours of practice done each day. A list of instructing motormen and conductors is furnished to each station master by the supervisor of employment and instruction, by whom the time slips of the instructing trainmen are compared with the time entries on the students' cards before they are passed for payment.

Motormen are required to practice for ninety hours, and conductors seventy hours before reporting to the employment office for final instruction. The men report between 8 a. m. and 9 a. m., and read over the bulletin book while other men are being employed. This work is usually completed by 10 o'clock, and the men are then taken in hand and examined on their work and duties. Full instruction is given on accident reports, handling complaints from passengers, and conduct while in uniform, as well as explanation of the why and wherefore of the various rules. Suggestions are given as to how the work may be most easily and accurately done and how men may get work other than that provided by the extra board. New men are told of the irregular hours they



NEW YORK STATE RAILWAYS
ROCHESTER LINES
INSTRUCTOR'S REPORT

Name Badge
Car Train
Date Time

Admonished	HAND BRAKE	AIR BRAKE	GENERAL CONTROLLER
Ratchets in stopping 1			
Spins handle 2			
Poor graduated release 3			
Not fully released 4			
Hand off running 5			
Hand off standing 6			
Correct			
Headway running 1			
Passing on curve 2			
Passing standing car 3			
Talking unnecessarily 4			
Reckless running 5			
Looking back in car 6			
Fast past blind streets 7			
Sounding gong 8			
Spins wheels 9			
Slides wheels 10			
Starts on one bell 11			
Passes up passengers 12			
Safety stops 13			
Sand 14			
Correct			
		1 Fans air	
		2 Emergency on standing	
		3 Poor graduated release	
		4 Runs in lap	
		5 Runs on slow release	
		6 Steadies car with air	
		7 Air on at terminus	
		8 Hand brake set with air on	
		9 Fails to use hand brake	
		Correct	
		1 Fast feeding	
		2 Off to series	
		3 Stops between notches	
		4 Runs on resistance	
		5 Stops in transition	
		6 Off too slowly	
		7 Power before release	
		8 Circuit Breaker	
		9 Off platform without handle	
		10 Reverse to stop	
		11 Electric track switch	
		Correct	

Instructor

NEW YORK STATE RAILWAYS
ROCHESTER LINES
INSTRUCTOR'S REPORT

Name Badge
Car Train
Date Time

Admonished	BELLS	COLLECTIONS GENERAL
1 Bell to Start 1		
Bells at end of line 2		
Before passengers are safely on or off 3		
2 Bells before car stops 4		
Correct		
Failure to register fares 1		
Register fares in bunches 2		
Register out of order 3		
Calling fares please 4		
Registers reading wrong 5		
Failing to turn register 6		
Correct		
		1 Error in trip sheet
		2 Mispunched transfer
		3 Announcing streets
		4 Announcing junctions
		5 Protecting rear step
		6 Position on car
		7 Backing car from inside
		8 Dirty steps and platform
		9 Ventilators
		10 Stoves
		11 Failing to get witnesses
		Correct

Instructor

NEW YORK STATE RAILWAYS—MOTORMAN'S INSTRUCTION CARD AND INSTRUCTOR'S REPORT

will work while "bucking the list" and are advised to be regular in their habits to avoid sickness and depression. The writer has known men who were thoroughly discouraged to take an entirely different view of their work after one or two visits to the company's physician, whose services are furnished by the benefit association.

The final instruction occupies usually from one and a half to two hours; the shorter this can be made the better it is for the student and the company. More good can be done by impressing a few necessary and important details than by giving vague ideas on a number of points of minor importance.

During the first six months of his service, the new man is followed up by the traveling instructor, who corrects his faults and tries to impart the fine points of his duties that can only be learned by experience. The instructor makes a report on the forms shown in accompanying figures every time he rides with a student. In the column headed "Admonished" a punch mark denotes that the man has been in error on the subject opposite the punch mark, and that he has been instructed on this point. A punch mark outside this column would denote that he was in error but was not admonished. Such a

report would be made, for instance, if the instructor noticed a man following his leader too closely, but did not have an opportunity at the time to warn him.

RECORDS AND RESULTS

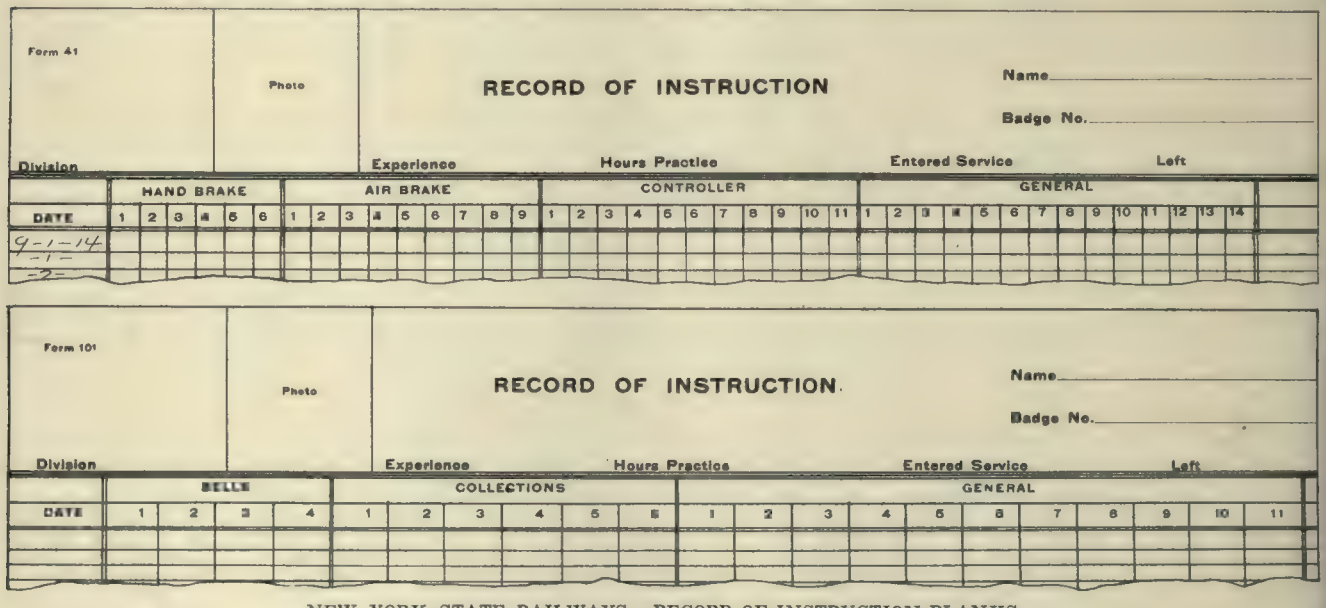
The reports received from the instructor are entered on the men's record of instruction, on forms like those reproduced herewith, which are kept in the office of the supervisor of employment and instruction. On these records the reports are stamped in red ink in the appropriate column, the letter on the stamp showing by whom the report was made, and the horizontal line showing the date. If a man's work was correct under any general head, a green stamp is used instead of the red. It is, therefore, possible to tell at a glance what sort of a record any individual is making, and on what points he needs additional instruction.

The reports of accidents made out by men during

EMPLOYMENT TABLE—NEW YORK STATE RAILWAYS, ROCHESTER LINES

	Motormen		Conductors	
1913	Total	Per Cent Under Six Months	Total	Per Cent Under Six Months
July	459	18.01	478	19.95
August	477	20.69	474	18.68
September	474	19.31	475	19.25
October	486	20.74	519	26.37
November	489	20.08	578	25.09
December	492	18.80	520	24.23
1914				
January	503	17.67	521	22.48
February	490	12.85	576	20.34
March	488	12.08	512	17.02
April	495	11.30	527	16.90
May	477	10.25	522	15.54
June	467	9.00	488	12.07
July	473	9.29	479	12.93
August	460	7.60	483	13.02
September	464	7.11	489	12.46

During the two years previous to July, 1913, the company had found difficulty in keeping enough men to operate the cars during the rush hours, and it was necessary,


Form 41
Photo
RECORD OF INSTRUCTION
Name
Badge No.
Division
Experience
Hours Practice
Entered Service
Left
HAND BRAKE
AIR BRAKE
CONTROLLER
GENERAL
DATE
9-1-14
-1-
-2-
Form 101
Photo
RECORD OF INSTRUCTION
Name
Badge No.
Division
Experience
Hours Practice
Entered Service
Left
BELLS
COLLECTIONS
GENERAL
DATE

NEW YORK STATE RAILWAYS—RECORD-OF-INSTRUCTION BLANKS

their first six months of service are also sent to the instruction department. On the backs of the instruction record cards of the individual trainmen the records of these accidents are entered in columns headed as follows: On the back of the motorman's card are columns for date, claim number, collisions with vehicles, collisions with persons, rear-end collisions with cars, side-swipe with cars, derailments, open switches, injured on car, frightened horses, damage to company's property, controller trouble, heater trouble, grade crossing accidents and miscellaneous. On the back of the conductor's card are columns for date, claim number, alighting, boarding, fare trouble, injured on car, disturbance on car, damage to company's property, heater trouble, grade crossing and miscellaneous. On each card is a liberal space allowed for remarks in which is entered a short history of the accident and the discipline administered.

Instead of being disciplined under the merit-and-demerit system, the new men receive additional instruction. This takes the form either of verbal instruction, written instruction, e.g., copying out a rule nine or ten times, or additional practice on the road of from five to thirty hours. In some cases a little talking is sufficient, and an offense which is followed by written instruction is not apt to be repeated. Additional practice has a good effect not only on the man at fault but also on other new men.

The following table shows the number of men in service on the first of each month from July, 1913, to September, 1914, and the percentages under six months in service:

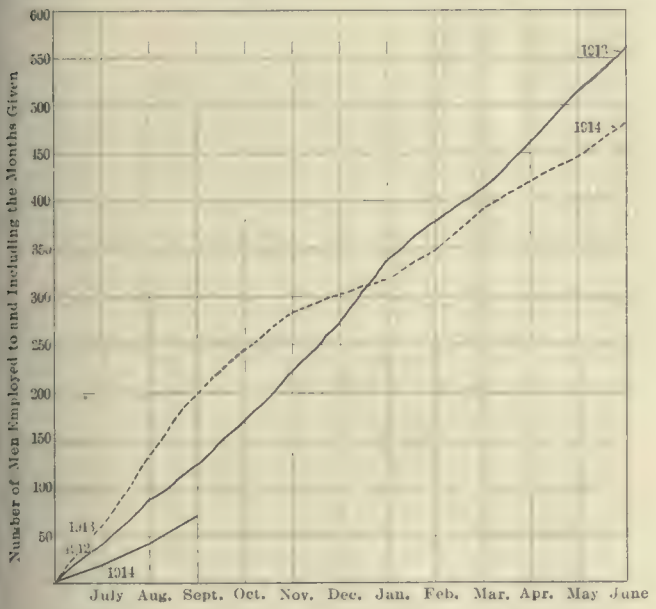
on the organization of the employment and instruction department, to employ additional men immediately. The most pressing need was for motormen, which accounts for the rapid increase in numbers from July, 1913, to January, 1914. During the late fall, trailers were put in service, but the snowplow crews required additional men, and no reduction in the number of motormen was possible until February or March, when the number begins to fall off. About the same time the age limit for motormen was changed from 21 years to 25 years, which resulted in our obtaining more reliable men who were less likely to leave the service. Economic causes were also at work to reduce the number of changes in personnel. The names of a number of inspectors who were still carried on the seniority list were also taken off, which had the effect of reducing the number of names counted in compiling the figures for 1913. The net result of all changes has been that the number of motormen has increased from 459 on July 1, 1913, to 464 on Sept. 1, 1914; while the percentage of men with less than six months' experience has fallen from 18.01 to 7.11 during the same period.

The need for additional conductors was not felt until the winter schedules were put in operation during September, 1913, when the total number of conductors shows a rapid increase. The number then attained was maintained throughout the winter months, and allowed to drop off during the spring. A rapid reduction is apparent during May, caused by the calling in of old badges and the weeding out of undesirable men. Economic causes, of course, had the same effect as in the

case of motormen, but the age limit for conductors was not changed from 21 years and the greater instability of the younger men is shown by the larger proportion that are under six months in service. The net change in number of conductors has been an increase from 478 on July 1, 1913, to 489 on Sept. 1, 1914, while the percentage of men less than six months in service has decreased from 19.95 to 12.46 during the same period.

A comparison between the number of men employed for the two years from July, 1912, to July, 1914, is shown on the accompanying diagram.

The effect of the instruction on the number of accidents occurring to new men is shown in the accompanying table. In this table, column 5 shows the accident index for the men under six months in service, i.e., the ratio of the accidents per 100 men under six months to the accidents per 100 men for all periods of service. The low figures for October and November are due to changes that were made in the method of compiling the



COMPARATIVE CURVES, MEN EMPLOYED 1912-1913

figures at the time this record was first kept. Since December these figures have been computed on the same basis and the index shows that the performance of the

ACCIDENT TABLE—NEW YORK STATE RAILWAYS, ROCHESTER LINES

	(1) Percentage of Men Less than Six Months in Service	(2) Percentage of Accidents for Men less than Six Months in Service	(3) Accidents per 100 Men Under Six Months in Service	(4) Accidents per 100 Men. for Total Men in Service	(5) Index 3 ÷ 4
1913					
October	22.66	35.16	67.5	43.4	1.55
November	21.63	35.00	66.2	40.9	1.62
December	20.10	34.60	83.5	48.5	1.72
1914					
January	16.72	27.60	76.8	46.3	1.65
February	14.60	23.31	78.0	48.9	1.60
March	14.18	21.92	83.4	54.0	1.54
April	13.02	18.30	50.0	35.7	1.40
May	10.58	20.43	94.0	48.7	1.92
June	11.16	20.98	76.4	40.6	1.88
July	10.40	18.24	78.5	44.7	1.75
August	9.87	19.30	63.8	33.1	1.93

new men improved steadily up to April, 1914. At that time changes were made in the organization of the department due to the necessity for retrenchment, and the efficiency of the new men has decreased to some extent. It should also be noted that with smaller numbers involved a numerically small increase in the number of accidents makes a relatively larger showing in the percentage table.

It has been the aim of the instruction department to make the new men as efficient as the old men in respect to the record of accidents, and this result was apparently at one time within the possibility of achievement. The net result obtained, however, has not been altogether unsatisfactory, as the reduction in the number of men new in the service has brought down the proportion of accidents due to new men from 35.16 per cent in October, 1913, to 19.30 per cent in August, 1914; a reduction of 45.2 per cent, and this reduction has accompanied a reduction in the total number of accidents of approximately 21.50 per cent for the current year.

A. I. E. E. Midwinter Convention

The third midwinter convention of the American Institute of Electrical Engineers was held in New York on Feb. 17, 18 and 19. The program comprised a dozen papers of which five contained practical information on power transmission matters. In other papers the topics discussed were: Characteristics of electric motors, distortion of a.c. wave form, dimmers for tungsten lamps, searchlights, and the theory and practice of electrical precipitation of matter suspended in gases. An evening was devoted to a symposium on "The Status of The Engineer," abstracted elsewhere in this issue, in which several very prominent engineers took part.

F. W. Peek, Jr., consulting engineer General Electric Company, compared the results of line corona loss tests, made during ten years under various conditions, with formulas developed on the basis of laboratory measurements. The agreement was satisfactory. The discussion brought out that voltages of less than visible corona values produce uncertain losses due to irregularities on conductor surfaces.

L. E. Imlay, superintendent Niagara Falls Power Company, described a successful method for keeping underground cables cool by insuring moistness of the earth surrounding conduits. Temperatures of cables are measured systematically and when they indicate deficient heat radiating capacity, due to soil dryness, water is distributed through porous drain tiles laid parallel with the conduits. Mr. Imlay gave valuable test data bearing on the heat conductivity of soils.

K. C. Randall, engineer Westinghouse Electric & Manufacturing Company, spoke upon arc phenomena in oil circuit breakers showing that an arc hangs on until the next zero value of current after a switch opens, generating an amount of heat depending upon the frequency. He described the improvements being made in breaker design, including the accelerating feature and the reactance shunt. On the rating of circuit breakers he recommended that "if a unit may immediately be put back into permanent satisfactory operation without immediate repair, it is proper for the particular application." In this he was seconded by Philip Torchio, chief electrical engineer New York Edison Company.

The 100,000-volt portable substation described by C. I. Burkholder, general manager Southern Power Company, and Nicholas Stahl, commercial engineer Westinghouse Electric & Manufacturing Company, consisted of three 1000-kva, self-cooling transformers with supplementary fan ventilation and three horn gap switches mounted on a steel flat car. It was arranged for convenient connection to the transmission lines of the Southern Power Company and adapted to use a wide range of supply voltage. The weight was 135,000 lb. and the cost $21,000, i.e., $7 per kva.

The paper on electrical porcelain by E. E. F. Creighton, consulting engineer General Electric Company, was a 100-page report of exhaustive character. It was divided into three parts, the first covering the principles and methods of testing insulators; the second, the factors in porcelain manufacture, and the third, the results of elaborate tests made with the high-frequency oscillator. The paper contained the results of extensive research many of which were presented graphically.

The Code of Principles

In a Letter to the Editors, O. T. Crosby Suggests Certain Changes in the Present Code—The Sliding Scale of Returns to Capital Discussed and Co-operation with Other Public Utility Associations Recommended.

WARRENTON, VA., Jan. 26, 1915.

To the Editors:

It is with sincere regret that I find myself unable to approve all that the Code seems to stand for. May I point out some of the difficulties as they appear to me?

It is doubtless your habit, as it is mine, to consider all problems, first, from the point of view of a citizen of the United States, and second, from the point of view of one's own personal interest. In my judgment, the question of private ownership versus public ownership rises above any question of the interests of those now putting their money or their time into public utilities. If every dollar which I, myself, happen to have in public utilities, and all the other dollars that my friends have, were to be fully repaid by the state in the taking over of public utilities, I should still feel strongly opposed to that action. The opposition would be based upon fundamental political convictions. It is because some of the opinions stated in the code seem to lead inadvertently toward state ownership or its equivalent, purely bureaucratic private ownership, that I feel it a duty to comment upon them.

It is not probable that the Association—a numerous body having very short hours of discussion every year—would undertake to amend a code presented to it by a committee of distinguished members. It is not with this presumption that I suggest changes in the language of several articles. It is only that such redrafting offers a convenient form of expressing my own views. The expansion suggested of Articles III and VIII results in mere commentary on, rather than change in, the original text.

Whether the forum in which we have usually appeared for such discussions, namely, the JOURNAL, is open for criticisms of the code, I do not know. You alone have the right to make that determination.

The first article of the code reads as follows:

The first obligation of public utilities engaged in transportation is service to the public. The first essential of service is safety. Quality of service must primarily depend upon the money received in fares. For this reason it is necessary that the rate of fare should be sufficient to permit the companies to meet the reasonable demands of patrons and to yield a fair return on a fair capitalization.

I think the last two sentences should be changed to read as follows:

"Quality of service, must, in the long run, depend upon the money received in fares. For this reason, it is necessary that the rate of fare should be sufficient to permit companies to meet the reasonable demands of patrons and to yield average returns to the whole industry sufficient to obtain, in competition with all other enterprises, necessary capital from the general investor."

My reason for substituting the words "in the long run" for the word "primarily" rests upon the fact that in the inception of any enterprise the selling price of its product may be placed so low, or there may be temporarily such small market for its product, that its operations are carried on at a loss of original capital. Moreover, as the excellent brief of the Public Service Corporation in its recent gas case points out, the company undertakes an obligation which may require the exhaustion, in losses, of all its capital. It is important that this element of risk should never be obscured. But, *in the long run*, the operation will cease unless selling prices be greater than costs.

The change suggested in the last sentence reflects my objection to the use of the term "fair," when it is possible to express more clearly the specific conditions which we mean to set forth. The fact that this word "fair" has found its way into decisions of courts and commissions, has not, unfortunately, clarified its meaning.

We are quite likely to cut each others' throats in controversy over the application of such words. Today in Europe, both the British and the Germans conscientiously believe that they are upholding a "fair" cause. In all rate controversies, commissions and companies declare for these same "fair" words.

Article II of the code reads as follows:

Regulated private ownership and operation of electric railways is more conducive to good service and the public welfare than government ownership and operation because the latter are incompatible with administrative initiative, economy and efficiency, and with the proper development of cities through the extension of transportation lines. The interests of the public are fully protected by the authority given to regulatory bodies.

I merely suggest that the word "is" should be changed to the word "are," thus securing euphony and grammatical uniformity at the same time. The general idea expressed by this article seems to be sound.

Article III of the code reads as follows:

In the interest of the public and good service local transportation should be a monopoly and should be subject to regulation and protection by the state rather than by local authorities.

The preference here expressed for state control as distinguished from local control is a wise one in our present political development. My own thought on the matter would be more fully expressed if we should add to the article as it stands, the following:

"When sound general principles of regulation shall have been developed by the state, and when municipal or other local governments shall have developed higher efficiency and conservatism than is now usually found, then the regulation of local monopolies might be left to local authorities."

Article IV of the code reads as follows:

Short-term franchises are detrimental to civic welfare and growth because they ultimately check the extension of facilities and discourage good service.

This is so sound that even short-term advocates of a few years ago have been generally converted wherever the twenty-year limitation has been tried.

Article V of the code reads as follows:

In order to render good service, electric railways must be allowed to earn a fair return on a fair capitalization, and the foundation for this result will be obtained if the issuance and sale of securities representing such fair capitalization shall be legally authorized on such terms as will produce the requisite funds.

I would suggest that this article be changed to read as follows:

"In order to render good service, the electric railway industry must be allowed to earn average returns on investment comparable to those obtained in other enterprises of like riskfulness, and the foundation for this result will be obtained if companies be legally authorized to sell their shares, or to borrow money on such terms as will produce the requisite funds."

It will be observed that the word "securities" is stricken out. The reason for this will be found in the comment on Article VI. The word "average" inserted before "returns" has an important bearing, appearing below.

Article VI of the code reads as follows:

Securities which have been issued in accordance with the law as it has been interpreted in the past should be valid obligations on which an electric railway is entitled to a fair return.

In substitution for it, I would suggest the following language:

"Shares of capital stock and evidences of debt which have been issued in accordance with the law, as it was interpreted at the time of issue, should be considered as valid, and on the total capitalization composed of evidences of debts (including net floating debt) and shares of stock, the company should be entitled to earn such returns as its contract for rendering service will permit, when the charge for such service is made specific in the contract. In the absence of a specific contract charge for service, the company should not be prevented, merely by the arbitrary use of public authority, from earning such returns on its legal capitalization as might have been legally contemplated from time to time when investments were made or debts incurred."

It will be observed that the word "obligation" has been stricken out. This, I think, follows from the fact that shares of stock are not obligations, but, on the other hand, they plainly were meant to be included in the term "securities." We have all come to use the latter term rather loosely, as standing for everything which represents the capital of a company. Such loose usage is quite excusable in many discussions, but it is out of place, it seems to me, in such a formal document as the Code of Principles.

It will be noted that a suggestion is made limiting the returns on legal capitalization to those that may have been "legally contemplated." This is the reason for that suggestion. It is (or it has been) possible in many states to issue legally capitalization which might be in excess of the investment by many hundreds of per cent. Thus, $100,000 in cash, or cash values, might be legally capitalized at $1,000,000 par value. Can it be said that stockholders in such a corporation, should, immediately after its organization, be "entitled to a fair return," on such capitalization?

Is this "legal capitalization" necessarily the same as the "fair capitalization" of Article V? Has not the mass of legislation, adjudication and discussion of the last twenty years created at least the beginnings of a new common-law rule, which would put the investor on notice that he would not be permitted to make a profit of 80 per cent or 100 per cent per annum, on his real investment, unless, perchance, it should flow from a specific (or fixed customary) service charge? And in such case, is it not true that such a profit would rest, not upon the basis of legal capitalization but upon the contract right to perform service on a given piecework basis?

I have also thought it important to make a distinction, which does not appear in the Code of Principles, between the case of a company which, on the one hand, has a contract right and a contract obligation to perform service at a specific rate, and, on the other hand, a company which finds itself subject wholly to public authority in the matter of rates.

In the electric railway field it was thought that a majority, at least, of the franchises were, in fact, contracts for the performance of service at what may be called "piecework" rates. And it was thought that that rate was fixed in the contract.

There were, indeed, variations in the language of the contracts concerning this point. In some cases, the doubt was great enough to justify, perhaps, some of the surprising decisions which have been made. On the other hand, a good many franchises still stand unattacked, and probably unattackable, in the matter of a specific charge for service as being a contract right and obligation. That specific charge may be found too small for profit, but when it is large enough for profit, then even if the returns be considerably above average, they should in no way be disturbed unless by mutual consent. That is what the investor is "entitled" to—that is to say, to losses or to gains, as the contract happens to work out.

In the other case, namely that in which no specific service charge appears in the contract, and if there be no customary charge then ruling the field of operations, the investor must fall back upon the good faith of the public and upon the contemplation of law, that he is "entitled" to try for the usual returns to capital and that he is not to be forced into loss by arbitrary exercise of power in fixing rates.

If a company enters a field in which rates have long been fixed by custom, then the case is similar to that of the contract rate. The investor must lose—he is not "entitled" to win—if he guessed wrongly as to the profits derivable from a customary rate. That is the sound common-law rule. He is entitled to big returns, if things go well. He is not to be held to the "average" return. That average is made up of his good luck and his neighbors' bad luck, and it is, under another aspect, made up of his good luck today and his bad luck yesterday.

Invention has destroyed the force of custom in modern affairs. Hence our turmoils.

Ancient common law looked to custom for the fixation of rates. It declined to consider return to capital in any specific case. Nevertheless, underneath the customary rate, there must have been an implication of variable returns from very high to very low. One innkeeper might grow rich, another might grow poor. Differences of result were due to differences in management and to other conditions over which the innkeepers had no control.

In the long run, however, there must have been "a return to capital" in the inn business, substantially equivalent to that in other lines of industry. The particular innkeeper was not "entitled" to any particular return to capital, whether called "fair" or otherwise. He was entitled, while charging customary rates, to the presumption that he might grow rich or poor. He was not to be made poor by interference of the state in lowering the customary rates.

The novelty of modern methods in nearly all public utility work renders it very difficult to rest any case upon custom. But the presumption that even very high returns may occasionally be made, still existed as an implication in common law, when vast quantities of private money went into the development of public utilities.

It is this presumption which is threatened by the frequent use of the expression, "entitled to a fair return." The courts, when using that expression, have, for the most part, been engaged in preventing confiscation of property. The Supreme Court of the United States has gone from ½ of 1 per cent to 8 per cent, under certain conditions, in an endeavor to establish return to capital as the definition or measure of the property which was threatened. As they have groped their way toward some understanding of the problem, they have always been handicapped by the natural desire to interfere as little as possible with legislative enactments.

At first they contented themselves by stating substan-

tially, as in the Munn case, that property was not taken unless the actual fee was transferred. In later cases they have seen that the property is valueless unless it can be used for making, or trying to make, an annual net profit, and that such profit is, in the last analysis, the measure of the value of the property.

Their recent decisions substantially establish the fact that a going concern has a property right, good against state intervention, to charge such rates as may yield 6, 7 or 8 per cent on the value arrived at by considering a number of elements. The decision is far from clear in respect to these elements.

The court has not recognized a right which was generally contemplated by investors fifty or sixty years ago, namely, that they might occasionally secure big profits, far beyond 8 per cent, as an off-set to occasional losses. It may be urged that practically this failure to recognize such a right has, in fact, through the power of the court, destroyed the right.

But we are now concerned in educating ourselves, the public, the legislative bodies and the courts, as to the true and necessary principles underlying such a treatment of public utilities as will continue to bring into existence new ventures and such as will preserve in old ventures the desirable qualities of private ownership. In view of the great steps forward, made by the Supreme Court itself, in its own education, it is no disrespect to authority that any citizen should urge views which, if adopted, would carry the Court still further.

Not only has invention destroyed substantially the force of custom for the determination of rates in the past hundred years but, in my opinion, it will continue to make so many changes in productive and distributive processes that we can no longer count upon this ancient guide to lead us through the mazes of the future.

Contracts for long periods at specific rates of service will also, in my opinion, gradually cease to be desired by public authorities. They may not even be wanted by investors in public utilities.

It seems to me, therefore, that new relations must be established in respect to the important matter of rates. I believe that the basis of that new relation will be "return to capital." And I believe, also, that this new basis must be made far more clear than it now is, before we can feel that we are working under a régime of law.

In trying to find a way out of the chaos which exists at present, it seems to me necessary to hold clearly before our minds just what the conditions are which are being changed or cast aside. That is the reason I feel we should refer in the code to the returns that must go to the industry as a whole, rather than those which go to individual companies, unless in the case of specific contract rates, or clear customary rates. The original language of the code, in Articles V and VI is not clear, it seems to me, as to this distinction. Hence the suggested change.

When we shall have emerged from the present difficulties, I believe we shall have statutes drawn which will express clearly the principle of a sliding scale return to capital. Such a statute would provide that specific sliding scale returns might be adopted, varying from case to case. Maximum and minimum rates of return to capital, with intermediate rates for varying periods and varying conditions, would appear in such contracts. In the general case, none of these returns to capital would be guaranteed.

The spirit of the contract would permit service rates to be controlled by the companies operating within the limits of the permitted returns to capital.

The same statute would provide such a sliding scale guidance for those cases in which public service might be undertaken without specific understandings as to return to capital. It would impose upon such cases limitations of profit which the investor is supposed to contemplate, just as if to-day a loan should be made without specific interest rate, it might be presumed to carry the so-called legal rate of interest.

And the same statute would provide that, as nearly as possible, the principles thus enunciated for new enterprises should be applied in the solution of the difficulties presented by old enterprises. In this latter case, however, an extremely important consideration must always be held in view, namely, that of the market values of stocks and bonds during past periods, when such stocks and bonds had been permitted to be freely bought and sold throughout the world, on the assumption that the investment would be controlled by the old common law rule which gave to the investor the full profits of customary or contract service rates, and at the same time threw upon him losses resulting from the application of such rates.*

If by the words "fair returns," as they appear in the adjudicated cases, we could assume that in some cases unusually large returns would be authorized, then one need not fear the use of such an expression. The fact is, however, the continued use of the expression "entitled to a fair return," both in the briefs of attorneys representing established corporations and in the appeals of public prosecutors, is gradually crystallizing to a maximum of 8 per cent. That is the danger.

The principle to be preserved is this—that any industry, as a whole, must receive "fair returns, etc.—" or it will cease to exist. But within the industry, there will be occasional bankruptcies, balanced by bonanzas. Unless the bankruptcies be prevented, the bonanzas should be permitted.

Article VII of the code reads as follows:

The relation of adequate wages to efficient operation should always be recognized, but electric railways, being public servants regulated by public authorities, should be protected against excessive demands of labor and strikes.

I should make it read as follows:

"The relation of adequate wages to efficient operation should always be recognized. Electric railway companies being public servants, regulated by public authorities, should be protected from all forms of violence or intimidation during strikes."

It is apparent that one element considered important by those who drafted the code, is in my suggestion eliminated, viz., that of protection by the state from "excessive demands" and from strikes. I do not believe that any employer can be protected against excessive "demands" of labor. This clause, as written, seems to imply that the rate of wages paid by public utilities should be fixed by public authority.

But even more, it is further implied that the right to leave the employment of the company is denied to its employees, if they go out simultaneously and make what is known as a strike.

Of course, the converse of the proposition is, that they shall be forced to serve against their will. It is true that enforced service of citizens is required by all governments in military defense. It is equally true that enforced service, except for military defense and as a punishment for crime, is considered as contrary to all that modern political progress has assured us. Nobody knows better than I how serious, even how tragic, may be the result of strikes, yet I cannot approve any restrictions of personal liberty in the relation contemplated, except that which restrains an ex-employee, or anybody else, from violence or intimidation directed

*A statute expressing these views in legal form and drawn for application to interstate railway commerce, was presented by me several years ago to the Senate committee on interstate commerce. It appeared on page 94 of the ELECTRIC RAILWAY JOURNAL for July 20, 1912.

against an employer, whether an individual or a company.

We may make progress by the adoption of contracts for personal service, including a money penalty for failure to continue the service during an agreed period. In the case of such contracts, the protection which would be given by the state is only that which it must afford to all citizens in the enforcement of legal contracts freely made.

We should not forget that if the principle of submission of wages to public authority is adopted, it cannot consistently be restricted in application to the wages paid to motormen, conductors and others constituting the more numerous body of employees. It would be legitimately extended to the determination of all salaries paid, from that of the president to that of the sweeper. If commissioners are to stand between the stockholders and the demands of motormen, they may legitimately stand between the stockholders and officials of the company.

If, however, the commissioners are supposed to protect—not the stockholder—but the receipts of the company required for improving the service, then equally should they control big salaries as well as little salaries. The result would be a complete hierarchy of employees, who must look to the public authorities for fixing their compensation. This would be a long step towards public ownership.

Even if this step were not followed by others in the same direction, it would do much to paralyze the effectiveness of private ownership as we now understand the term. The subject is a large one. I content myself with expressing very positive views on the subject, without much argument.

Article VIII of the code reads as follows:

The principle of ownership of securities of local companies by centralized holding companies is economically sound for the reason that the securities of the latter have protection against the varying business conditions of a single locality or company and because money for construction and improvements can thus be more readily obtained.

The principle appearing in this article seems to me sound. However, for the word "because" I would substitute the word "hence." Furthermore, to be quite accurate, the last statement of this article should be extended to read as follows:

"—and hence money for construction and improvements can thus be more readily obtained, unless public authorities strike down occasional prosperity in an electric railway company to the low level of the most unprofitable among such enterprises."

It is well known that the opposition to holding companies rests chiefly on the idea that one locality is milked for the benefit of another. Put in other words, that means that in the present hectic temper of the public no locality is willing to see its own public utilities showing a prosperity above the average. Indeed, there are not a few critics who desire to depress every prosperous public utility to the lowest known level of mere existence. Should this sentiment become more general than it now is, it will make the last statement of this article unsound.

The fact which that statement intends to bring out is this: that of several companies whose stocks are all owned by a holding company, one may be prosperous and another unfortunate, and that the strength given by the prosperous company to the holding company's stock will permit money to be advanced to the weak concern. The investor is given a chance in a very simple way, through the purchase of one stock, to average his returns, which is the very essence of all investment, but if the average is to be made a maximum and no guaranty be given to support the bad cases, obviously a new low average is created and the whole scheme fails.

Article IX of the code reads as follows:

In the appraisal of an electric railway for the purpose of determining reasonable rates, all methods of valuation should have due consideration.

In my judgment there should be added to this article the following words:

"—but actual investment in cash or cash values, including profits invested, and average market values of bonds and stocks, during a period of years, should be given greater weight than valuations by other and more artificial methods."

Article X of the code is sound and requires practically no comment.

Since writing the above, I find that one of the speakers at the mid-winter convention, adverted to the probability of action by the Association looking to possible modifications in the code.

Although the letter above written expresses my own dissatisfaction with some portions of the code as it now stands, I venture to suggest, before formal action be taken in the matter of change, that endeavor be made to co-operate with other public utility associations, such as those of the gas, electric light, telephone and steam railway interests.

The latter industry, particularly by reason of its magnitude and by reason of the influence throughout the country of the Interstate Commerce Commission, is likely to affect very seriously the public utility policies in every state. These policies in the long run and in principle should be the same for all public utilities. Hence, it seems to me desirable that co-operation should be brought about in giving formal and public expression to the views of those who are conducting public utilities of all kinds.

OSCAR T. CROSBY.

Ohio Compensation Rulings

The Ohio Industrial Commission, in connection with the claim of Flora Hamilton for the death of her husband, has announced the following four principles on compensation of importance to electric interurban railways:

"1. Electric interurban railways and their employees engaged only in interstate commerce are subject to the provisions of the workmen's compensation act of 1913.

"2. Electric interurban railways and their employees engaged in intrastate and also in interstate and foreign commerce are subject to the provisions of the compensation act only to the extent that their mutual connection with intrastate commerce may and shall be clearly separable from interstate commerce, and then only when the railroad and its employees have filed written acceptances of the provisions of the act.

"3. There is no distinction between steam railroads and electric interurban railways so far as the application of the compensation act is concerned.

"4. An electric interurban railway company whose track lies wholly within the State, but which has traffic arrangements with other common carriers and accepts freight and passengers for transportation into other states, and which has filed its freight and passenger traffics with the Interstate Commerce Commission, is engaged in intrastate and also in interstate and foreign commerce."

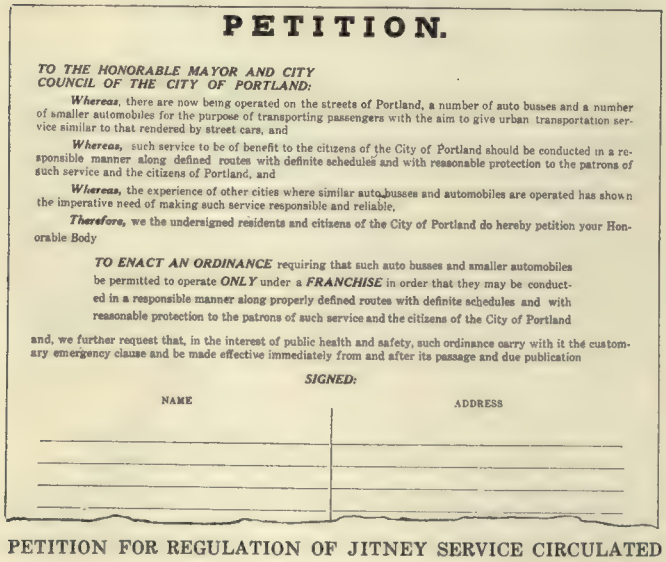
Regulation for the Jitney Bus

Recent Developments Have Shown the Need for Controlling the Operation of Itinerant 5-Cent Bus Lines, and the Steps Taken in This Direction by Various Communities Are Outlined, with Brief Accounts of the Experiences Making Them Necessary

The sudden advent of the jitney bus in urban transportation has placed before the electric railway systems of the country a situation which obviously needs prompt attention. To this end it may be said that the policy of regulation for the new conveyances appears to have been generally accepted as a satisfactory solution by most communities that have taken the problem under serious consideration, and in many cases restrictive measures either have been or are about to be applied. Even in Los Angeles, where the jitney bus movement started and where the city's friendliness toward the auto bus has been demonstrated, the need for regulative measures has become obvious to many of the citizens.

ESSENTIALS OF JITNEY BUS ORDINANCE IN LOS ANGELES

As a result of this sentiment Mayor Rose of Los Angeles submitted on Feb. 8 an urgent request for immediate regulation of the jitney bus traffic. His statement pointed out that the city of Denver had met the situation by passing an ordinance requiring each bus to take out a franchise, that San Francisco had under consideration a regulatory ordinance, and that Pasadena had already passed such a measure. He then outlined the following points which appeared to be essential for a satisfactory ordinance:



PETITION.

TO THE HONORABLE MAYOR AND CITY COUNCIL OF THE CITY OF PORTLAND:

Whereas, there are now being operated on the streets of Portland, a number of auto busses and a number of smaller automobiles for the purpose of transporting passengers with the aim to give urban transportation service similar to that rendered by street cars, and

Whereas, such service to be of benefit to the citizens of the City of Portland should be conducted in a responsible manner along defined routes with definite schedules and with reasonable protection to the patrons of such service and the citizens of Portland, and

Whereas, the experience of other cities where similar auto busses and automobiles are operated has shown the imperative need of making such service responsible and reliable,

Therefore, we the undersigned residents and citizens of the City of Portland do hereby petition your Honorable Body

TO ENACT AN ORDINANCE requiring that such auto busses and smaller automobiles be permitted to operate *ONLY* under a *FRANCHISE* in order that they may be conducted in a responsible manner along properly defined routes with definite schedules and with reasonable protection to the patrons of such service and the citizens of the City of Portland

and, we further request that, in the interest of public health and safety, such ordinance carry with it the customary emergency clause and be made effective immediately from and after its passage and due publication

SIGNED:

NAME ADDRESS

PETITION FOR REGULATION OF JITNEY SERVICE CIRCULATED IN PORTLAND, ORE.

A proper definition distinguishing automobiles acting as public carriers from those engaged in delivery business. A proper form of application covering the name of the owner, make of the machine and the carrying capacity, the proposed route and the schedule. The vesting in the Public Utility Board of the right to pass upon all applications and to adjust them if the routes as scheduled are unsatisfactory, together with the right to change or modify routes when traffic conditions or public necessity, in the opinion of the Board, demand such action. An approved indemnity bond of not less than $10,000 to accompany each application. A prohibition for carrying passengers on the running board, and a provision for uniform signs. Provision for the revocation of the license for failure to cover route and meet schedule, carrying passengers upon running board, failure to pay claims for damages, changing routes without permission of Board, and running an insufficiently lighted car after dark.

CAMPAIGN FOR REGULATION IN PORTLAND, ORE.

Shortly after the jitney bus appeared in Portland the Portland Railway Light & Power Company, recognizing the need for regulation of the jitney competition with its railway lines, published two pamphlets, one of which explained the situation in detail to the company's employees, but copies were also available for the public. The text of this pamphlet appears in full on page 396 of this issue. The other pamphlet was addressed directly to the public and was generally distributed. It contained the following statements:

"Concerning Taxes—Nearly one million dollars! $971,836.06 per year, $80,986.33 per month, $2,662.50 per day, or 15½ per cent of its gross revenue was contributed in 1914 by the Portland Railway, Light & Power Company to federal, state, county and city governments for the mere privilege of doing business! Thus:

Taxes and licenses	$649,762.16
Bridge tolls	61,464.00
Interest, depreciation and maintenance on street paving	260,609.90
Total	$971,836.06

"Consider the annual charge for paving. The company is required under its franchise to pay for the paving along its tracks, to maintain this paving during its life and to renew it when it is worn out. The actual bare cost of the specific construction of this paving now in use amounts to the vast sum of $1,737,399.33 which is 15½ per cent of Portland's total investment in street paving. This great sum does not include any allowance for overhead charges, for engineering, superintendence, etc., a very large amount in itself, which could be fairly included, but figuring only the actual specific construction cost, the company, on account of the street paving, must take from its revenues yearly: Interest at 6 per cent; maintenance at 3 per cent; depreciation at 6 per cent, or a total annual charge of 15 per cent of $1,737,399.33, equal to $260,609.90 per annum.

"Excepting such paving charges which are levied against the company's realty, all paving assessments along the company's tracks are but a survival of the system of charges from the old horse car days when the motive power did wear out the paving, but, in these days, since the electric cars do not need or use the pavement, assessments for its construction, up-keep and renewal are in effect nothing more nor less than a governmental charge or franchise tax on the street car company.

"Do you believe in double taxation? Of the total taxes collected by the city and county for the operation, maintenance, bond interest, rentals and sinking funds, for all bridges used by the general public, crossing the Willamette River in this city, the pro-rata share of the taxes paid by the company apportioned to these purposes for 1914 was $11,513. On top of this the company was required to pay $61,464 for bridge tolls. Was any other firm, person or corporation in Portland required to pay a toll in addition to their regular tax for the privilege of using the bridges? Even forgetting the

tolls, did any other firm, person or corporation contribute as much to the expense of these bridges as this company?

"Over $10,000 per month for the schools! Do you know that, of the total taxes paid by the utility company in 1914, $120,110 was applied to the education of children in public schools in Portland? This is over $10,000 per month or about $550 per school day.

"Nearly $1,500 per month for the fire department! Of the total general taxes paid by the company, $17,720 per year was applied to the support of the fire department.

"Over $1,000 per month for the police department! In the same manner, $12,739 per year went to the support of the police department.

"Over $555,000 a year from the street car system alone, or 18 per cent of total street car revenues! Of the huge sum of nearly $1,000,000 charged the Portland Railway, Light & Power Company in 1914 for the privilege of doing business, about $550,000 per year, $45,800 per month, or over $1,500 per day must be contributed by the city street car system. The average revenue per passenger carried (cash, commutation ticket and transfer passengers) for all of whom facilities have to be furnished, was 3.58 cents for the year 1914.

"Even omitting the cost of carrying them, consider how many passengers at the average fare must be carried to pay this immense charge! In round numbers—42,000 passengers per day, 1,275,000 passengers per month, 15,350,000 passengers per year.

"Also just figure for yourself how many passengers had to be carried during the year to help maintain the police department, the fire department, the public schools and the bridges. Furthermore, letter carriers and county employees are carried for several hundred thousand rides at compensation which is less than cost for the service.

"In conclusion, did you ever stop to think that during 1914, police and firemen and other city employees, enjoyed free transportation as required by our franchises to considerably more than 750,000 rides, which, at the usual ticket rate, would have cost the city for this service about $33,750. Is not this additional tax?"

The effect of these two pamphlets had almost immediate results. The employees of the company, realizing that they would be directly affected by unrestricted jitney bus competition, prepared and circulated a petition to the Mayor and City Council. A reproduction of this is shown in an accompanying illustration. Last reports indicated that some 40,000 signatures would be on the petition when it was presented to the Council.

One of the complications arising in Portland is the general opinion that regulation over the jitney buses should be in the hands of the State Railroad Commission. The State Railroad Commission, however, can do nothing legally until the jitneys obtain franchises from the city. Two State bills are under consideration at the present time in Oregon, one of which plans to make the jitney subject to the same regulations as the street railways and the other provides for regulation of automobile common carriers outside of the city, placing them in the category with steam railroads. Another measure is at the present time under consideration by the State Senate requiring the issuance of a certificate of public convenience and necessity prior to the beginning of any new construction or exercising of franchise rights by public utilities. This also appears to affect the jitney situation.

It is interesting to note that in Portland the principal owners and drivers of jitney buses have formed a temporary organization and plan a permanent organization and a general system for the service throughout the city. Four citizens have already petitioned the City Council for a franchise for a permanent jitney line. The applicants intend to establish routes to all parts of the city, running on schedule from seven in the morning to twelve at night, the fare being 5 cents. Waiting stations are planned for designated places, together with signs erected at proper points.

Ordinance in Boise, Idaho

Jitney service in Boise City, Idaho, has been recently proposed by several promoters, but in every case it has been discouraged by an ordinance which was recently passed by the city council. This ordinance appears in full on page 397 of this issue. In Lewiston, Idaho, a peculiar situation has developed in connection with the jitney-bus craze. The city has at present no local street railway, but the inauguration of jitney service on Jan. 26 brought out a great deal of comment that was unfavorable. This attitude was emphasized by the possibility that, within a short time, an electric railway will be brought into the city of Lewiston and that the prospect of jitney competition would tend to discourage the promoters. Another interesting situation arising from the jitney in Lewiston was the statement of the operators of the jitney buses that the first day's operation had shown that the 5-cent rate could not be maintained and that consequently the fare for all routes would have to be raised to 10 cents.

Jitney Service in St. Louis

In St. Louis the introduction of the jitney has developed along unusual lines. An unincorporated organization has been formed by an individual who styles himself as president and general manager. The members act as chauffeurs of the cars, each chauffeur owning his own machine. Each chauffeur is supposed to pay to the general manager 5 per cent of his gross receipts.

Under these circumstances jitney service was inaugurated on Feb. 8. On the second day of operation seven cars were in use and amid considerable enthusiasm the president of the company reported a most satisfactory day. On the third day, however, two of the jitney buses fell by the wayside after counting up the day's receipts. Features of succeeding days' operation were the entrance of women chauffeurs, and the wave of indignation which arose because of the announced ban on negro passengers, anonymous communications from negroes being reported to have stated that, "Street cars are good enough for us anyhow." The jitneys remaining in service were all seriously overcrowded, five-passenger-machines carrying eight and ten persons on one trip, and one seven-passenger car having been reported to have carried eighteen passengers, of whom six stood on the running boards, while two sat on the housed canopy with their legs hanging over the shoulders of the passengers in the rear seat.

At the end of last week, the reports were that 2000 passengers were being carried daily by eleven automobiles and one thirty-passenger auto truck. The average daily earnings of the touring cars in operation are said to have been about $10, the record for receipts reaching a maximum of $13.50. This applied to a man driving a seven-passenger touring car.

A remark made by the promoter of one of the auto-bus lines in St. Louis provides an interesting insight into the mental attitude of the jitney-bus operator. The statement was that it was doubtful whether the jitney-bus could be made to pay on streets other than those upon which cars were run. The passengers who were waiting for street cars were those to whom the jitney-bus appealed, and they had to see the jitney in front of them before they would consider riding in one. It was doubtful whether they would seek another street to get a bus.

No provisions for regulation of the jitney service have been made as yet in St. Louis, and on Sunday last the fares were all raised to 10 cents for the day, rides being given to those looking for an outing at various parks. Contrary to experience in other cities no serious accidents to pedestrians have been reported from St. Louis, but the operators have already provided that damages from accidents are not to be assessed upon the jitney-bus organization as a whole.

Many Accidents in Kansas City

The jitney appeared in Kansas City about the middle of February. The service was well received by the public, and the business has grown until they now have over 200 buses in service and there are all kinds of plans for special uses of jitney buses in the air as well as plans for new routes. In Kansas City the jitneys are organized under two non-incorporated companies, to which the bus operators pay weekly fees of $1 and 50 cents respectively for arranging schedules and routes and preventing competition. Each organization has rented a waiting station in the downtown district past which all cars run.

Congestion is the notable feature of the situation at Kansas City, although as yet no definite means for regulating the service has been developed. A number of serious accidents have already occurred, and the first death caused by a jitney-bus took place on Feb. 7. There appears to be difficulty in placing insurance for jitney owners, as the insurance companies do not care to take the risk. The committee of the city council has asked the city counselor to draft an ordinance providing for the control of the cars and for the imposition of a reasonable tax.

During the past week numerous fines have been imposed on jitney drivers for violating traffic rules, and frequent hard-luck tales have thus been brought out. These are borne out by the report that the number of small automobiles in jitney service in Kansas City seems to be diminishing. However, many larger cars, chiefly trucks fitted with bodies capable of seating from twelve to eighteen passengers, have been recruited, and these have good custom during rush hours in fair weather. The managers of the jitney associations are admitting frankly that the small cars, at least, cannot be operated profitably except on definitely arranged schedules over routes of less than 2 miles. Several large passenger cars have assumed boulevard routes, one owner picking up passengers from several family hotels.

The "Kansas City Jitney Transportation Company" is now being organized, the trustee being W. H. Miller, who ran the first jitney and has been organizing the service at one of the jitney stations. An advertisement was published on Sunday, Feb. 14, stating that subscriptions for stock would be received.

The police have been attempting to regulate the jitney traffic, but owing to the absence of a restrictive ordinance the only recourse is arrest for violation of traffic rules. Judges of city courts are fining violators $5 and $10 for failure to stop behind a standing street car, for driving on the wrong side of the street, for blocking traffic by standing at street crossings, for fast driving and for failure to show licenses. The judges have declared that fines would soon be increased if frequent violations continued.

There have been at least two holdups of jitney drivers and passengers. In one case the robbers forced the driver to go to the State line, where $7.85 was taken from him and $1.75 from a passenger. Another case was that of a visitor to Kansas City, whose pockets were picked of $75 and railroad tickets in a jitney. One jitney owner narrowly escaped arrest by federal officers. He had a picture of a nickel painted on the side of his car but covered it after being warned that money must not be pictured.

Jitney Men Oppose Spokane Regulation

Ever since the first of February the city of Spokane, Wash., has been in the throes of development of regulatory measures of the jitney bus. Numerous letters from citizens have been received from the City Council and four different ordinances have been under consideration. Among these is one that has been prepared by the jitney operators, who have combined and employed counsel to meet the issue of regulation.

The ordinance proposed by the jitney operators includes a flat-rate license tax ranging from $25 for cars carrying five passengers or less, and $75 for cars carrying ten or more passengers. No bond is provided for on the ground that the jitney men will voluntarily carry insurance to protect themselves and their patrons. In commenting on this at a recent hearing, the attorney for the jitney operators stated that a $5,000 bond or even a $2,000 bond would mean the practical exclusion of many men from the business, but how protection could be given without it was not explained in detail. Owing to the existence of the initiative-and-referendum law in the State of Washington, the jitney operators are talking about the use of a referendum to protect the interests of the jitney operators in case a drastic ordinance should be passed, with the expectation that the public would support the jitney buses.

In a recent hearing a great deal of stress was laid on the lack of protection in the car to women and girls. Other comments by citizens are "The jitneys run when they feel like it and only where the business is best." "Any old automobile will do for a jitney as long as it hangs together." "If barbers need an examination, jitney drivers certainly do." "The jitneys are no more than pirates, unless they are made to go as far as the street cars." "Do not let the jitneys pile in passengers like pigs. I have no sympathy for adult women who sit on men's laps, but I do not approve of this for young girls." One sarcastic citizen suggested that the jitneys should provide free rides for police and firemen and half fare for children.

Competition with San Francisco Municipal Line

Notwithstanding the fact that the city of Oakland has passed a jitney ordinance as outlined in the Electric Railway Journal for Feb. 13, the city of San Francisco, just across the bay, took no action for a considerable period after the jitneys began to operate, regardless of the protests against them. On Feb. 6, however, the jitneys began to operate on Geary Street alongside of the municipal street-railway line, and this, according to press reports, has awakened the interest of the local authorities in the preparation of a jitney ordinance. When inquiries began to be made as to who was responsible for the invasion of the territory of the municipal line, the leaders of the local jitney-bus association pleaded not guilty with considerable vehemence. In consequence a rumor promptly started to the effect that the United Railroads of San Francisco were behind the scheme, with the idea of showing the city fathers how the jitney competition felt. According to the local newspapers, Charles N. Black, of the railroad company, unemotionally stated that he did not even know the jitneys were running on Geary Street. However, the Mayor of San Francisco is going to investigate the unfair competition with the city-owned railroad and will announce his findings later on.

Newspaper comments point to the fact that the jitney buses as at present conducted in San Francisco constitute an almost intolerable nuisance to all except those

who wish to ride in them, and that at present those who do not ride in the jitneys greatly outnumber those who do. It is said already that pedestrians are unable to cross Market Street in the congested district without taking grave risks of accident, thus bearing out the prophecy that transportation by jitney-bus on a large scale was a physical impossibility.

REGULATION BY COMPETITION IN JOPLIN, MO.

The Southwest Missouri Railroad, which operates the electric railways in Joplin, Mo., and adjacent cities, has suffered from the jitney-bus competition for some weeks without any prospects of relief by regulation of the new service. Therefore the organization of an auto-bus company to compete with the jitneys has been hit upon as a means for driving the latter out of business. This novel expedient has been fathered by the stockholders of the railway, although they are acting in their individual capacities and not in behalf of the railroad.

The new company already has bought four new auto-buses, each with a seating capacity of twenty passengers. All are of the latest and best type, and upon arrival from the factory they will be placed in service between Carthage and Jasper, Joplin and Neosho, and Galena and Baxter Springs. The four buses contracted for are said to be only a beginning, and as many more will be obtained as may be necessary to give adequate interurban service between the towns named or to supply the demand for service elsewhere if it should arise.

The citizens of the towns to which the new auto-bus service is to be given have been waiting for some time for the Southwest Missouri Railroad Company to extend its lines into their precincts, but for good reasons these extensions of the electric railway tracks have not been built. Now, however, the towns will have an interurban service by the use of gasoline propelled vehicles.

One of the promoters, in sardonic vein, states that two advantages in the proposed mode of transportation are: First, freedom from the cost of constructing and maintaining street paving. Second, the ability to flit into a new territory whenever regulation in the original one becomes unbearable.

MYSTERIOUS PLAN FOR REGULATION

In connection with the matter of jitney-bus regulation the following self-explanatory letter is of certain interest. It has, apparently, been sent to a large number of electric railways in the country:

"To the ——— & ——— Railway Company,

"Gentlemen:

"Conscious of the growing evil of the 'Jitney Bus' as a competitor of the Street Railway Companies, I have evolved a plan, which, in my judgment, if placed in operation, will practically, and perhaps completely, eliminate the 'Jitney Bus' as a competitor of your Street and Suburban Railways.

"My Plan is short, simple and comparatively inexpensive to put into operation, and will in no way disturb the present order of your management; and I hereby offer to communicate to you the Plan upon the execution of the enclosed agreement.

"My Plan is one which your Company can operate successfully without interference by State, City or County Authorities.

"Your prompt attention will be profitable to you.

"Yours truly,

"F. A. MARCHER."

Attached to the letter is a blank form for a formal agreement proposing, for a consideration, to put the recipient next to "a Plan which, if put into operation by the parties of the second part, will work greatly to their advantage in eliminating the jitney." The consideration appears to vary from $5,000 down to $50. It is not known how many clients have been obtained, but no doubt the idea is a gem. Mr. Marcher is a Los Angeles jeweler.

Standard Boiler Code Approved

The American Societyof Mechanical Engineers Has Adopted Universal Standard Specifications for the Construction of Steam Boilers

The American Society of Mechanical Engineers has placed its final stamp of approval upon the standard code for the design and construction of steam boilers which has been in course of preparation for the past three years. This, it is hoped, will become standard throughout the United States. Its general adoption will make it possible for manufacturers and the public to obtain from any manufacturer in any state a uniform and safe boiler. Its formulation has made possible the elimination of the necessity which exists at present for making a special design of boiler for each state in the Union, and owing to the fact that boilers built under the new code may be universally used the cost of manufacture will be materially reduced. Before this condition is reached, however, it will be necessary for five states, namely, Massachusetts, Ohio, Pennsylvania, Wisconsin and Indiana to amend their present laws so as to permit the use of the standard code. The laws existing in these states are so different from each other as to make conditions chaotic.

It is expected that immediate legislative action toward the legal adoption of the new code will be taken in many of the states in the country as the American Society of Mechanical Engineers has been advised in many cases that measures legalizing the use of the standard code are to be proposed at the present sessions of various state legislatures. This, in fact, accounts for the pressure which has been brought upon the American Society of Mechanical Engineers and the boiler-code committee to bring out at the earliest possible moment specifications in a form such that they could be used by the state legislatures.

The successful formulation of a single code which can be universally used has been due largely to the faithful and painstaking efforts of the boiler-code committee of the American Society of Mechanical Engineers. This has been composed of John A. Stevens, chairman; William H. Bohn, Rolla C. Carpenter, Richard Hammond, Charles L. Huston and Edward S. Miller. On the original committee were also H. C. Meinholtz and E. D. Meier, but both of these members died before the work of the committee was complete. During the last seven weeks the committee met daily including Saturdays and holidays, and would frequently work until midnight, in order to complete the code and to harmonize the necessities of the various interests involved. These included the manufacturers of steel and of tubes, the builders of boilers of various types, such as heating boilers, pressure boilers, and agricultural boilers, and the makers of safety valves and other classes of boiler equipment.

By instruction of the Council of the American Society of Mechanical Engineers, the code as now issued covers only the design, construction and materials entering into the boiler. Rules for inspection, for operation and for licensing operators have not been included at the present time. The society, as such, will have nothing to do with the work of getting the standard code adopted by the various state legislators, as that is obviously the province of the various governing bodies interested. It has not been thought consistent for the organization which has been interested in the

technical details of the code to concern itself with the making of the laws by which these details may be brought about as a universal standard.

It might be said at this time that the new specifications do not apply to boilers which are subject to federal inspection and control, including marine boilers, and boilers of locomotives and other self-propelled apparatus. The new code will be printed and ready for distribution within a few weeks.

Status of the Engineer

Noted Engineers, Executives and Educators Contribute to Important Symposium in New York on February 17

The Wednesday evening session of the third midwinter convention of the American Institute of Electrical Engineers was devoted to a symposium on the status of the engineer. Those contributing to the discussion were L. B. Stillwell, E. W. Rice, Jr., E. M. Herr, Alexander C. Humphreys, George F. Swain, H. G. Stott and J. J. Carty. The chairman of the meeting was President P. M. Lincoln.

Mr. Stillwell defined the character and reputation of the engineer and pointed out how the latter can be improved. He outlined what the engineering societies can do in this direction, particularly by more carefully selecting and grading their members and by enforcing their codes of ethics, expelling members who violate them. Joint committees of the engineering societies might also reach a decision for or against the licensing of engineers. Engineering societies can also assist in improving the status of the engineer by furnishing information to legislative bodies regarding broad economic policies.

Mr. Rice pointed out that honesty is a habit with the engineer, necessarily so because his work must stand the test of experience. He pointed out a new field for the engineer in politics. The House of Representatives and the Senate of the United States are largely made up of lawyers, 65 per cent in the former and 75 per cent in the latter, while there is only one engineer in both houses. He believed that the engineering fraternity should be represented not only in an advisory capacity but also in an administrative one.

Mr. Herr showed that engineering and the engineer must stand for progress and improvements. An important field in addition to others mentioned for the engineer is the commercial one. The handling of men is a most important part of his work. Mathematics, which forms a vital element of the engineer's training, unfits him for solving human problems. He must apply himself to solving these human problems and in doing so the reaction upon him will be favorable.

Dr. Humphreys stated that the sooner a young man gets the fundamentals of engineering and graduates into the school of experience the quicker will he become a real engineer. He should, of course, have more than the mathematics and science of engineering, but life is too short to study in college all that might be desired. Dr. Humphreys especially dwelt upon the work of engineers as public service commissioners. While he did not advocate commissions made up exclusively of engineers, he thought that an adequate representation of engineers should be the rule.

Prof. Swain contended that the engineer is recognized to the extent that he deserves. In analyzing the status of the engineer as a leader, he pointed out that this depends upon knowledge and personal qualities, of which the latter are more important. If the engineer does not lead it is largely because he lacks the necessary personal qualities. In Prof. Swain's opinion, engineers are adequately paid and recognized as compared with other professional men. Engineering training as given does not attract the best type of men and it has a tendency to narrow the outlook of those who take it. The remedies for this condition are first to induce more able men to embrace the profession by pointing out to them its possibilities. Technical education should be influenced in the direction of providing broader training and giving skill in the use of English. The engineer should somehow be given a broader outlook upon engineering problems, as the great questions of the day are not mathematical but social.

Mr. Stott made a plea for the government engineer, who, in his opinion, does not receive proper recognition. The great public works performed under government supervision are due to engineers who are not adequately paid and who receive little fame for their endeavors. Taking up the subject of specializing, Mr. Stott showed that engineers must necessarily be divided into two classes: first, those who specialize and whose reward is in achievement in one or two lines; second, those who generalize and gradually pass from engineering to administrative work.

In closing the discussion, Mr. Carty showed that the engineer is one who can design machinery to produce results at an ultimate cost lower than is possible without it. A labor-saving machine is really a labor-making machine unless it produces this result, for while it may transfer the labor to remote parts of the economic system, the labor is there just the same.

Need of Regulation

W. W. Atterbury, vice-president in charge of operation of the Pennsylvania Railroad, in a recent address before the combined commercial organizations of Philadelphia, discussed the subject of regulation. Mr. Atterbury said that regulation heretofore has largely consigned itself to correcting transportation abuses. The evils are obvious, but so much attention has been paid to the pulling of the weeds in the transportation garden that the very important duty of cultivating and strengthening the growth of the healthy and useful plants has been neglected. In Mr. Atterbury's opinion, the great transportation machine of this country is found. It needs continued regulation, but the regulation must be competent and sympathetic. The most pronounced weakness of the present system is that it is incompetent. Laws are lightly passed by legislatures without any real knowledge of what is involved, and action is taken by commissions who have no full conception of the delicate mechanism they are handling, or of how the public interest may be finally affected by their lack of experience and training.

To overcome these defects, Mr. Atterbury made the following suggestions:

"'A minority of the railroad commissioners of the states and nations should consist of men trained in the practical conduct of railroad affairs. All appointments should be for life or during good behavior, and the salary should be such as to attract the ablest brains in the country. These positions should be surrounded with such prestige and honor that any citizen would feel that he could serve his country and his fellowmen in no more exalted capacity than in representing the people in promoting, encouraging and regulating the development of its transportation agencies. The business men of the country, whose welfare is so intimately interdependent with the transportation system, represent the class of citizens from whom the initiative should come in putting a new spirit into the present system of regulation. Scientific management is needed in business but it is also needed in regulation or the latter must and will result in strangulation.'"

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Reports of Meetings of Committees on Rules, Engineering-Accounting and Passenger Traffic—Additional Details of First Manila Section Meeting—Manufacturers' Association Notes

COMMITTEE ON RULES

A meeting of the committee on rules was held in New York on Feb. 11, 1915. There were present W. H. Collins, chairman, Gloversville, N. Y.; Edward Dana, Boston; W. R. W. Griffin, East Liverpool, Ohio; S. W. Greenland, Fort Wayne, Ind.; C. E. Morgan, Jackson, Mich.; W. C. Callaghan, Helena, Mont.; and L. H. Palmer, New York. J. W. Brown, Newark, N. J, representing the committee on block signals, also attended the meeting.

The matter of indexing of rules of the city and interurban codes was first taken up and this was referred to Mr. Palmer to act in conjunction with Secretary Burritt. The rules covering markers and their location, which had been referred back to the committee by the 1914 convention, were then discussed at length, and a new rule regarding display of markers was adopted, providing greater flexibility in the character of signals than was the case in the rule proposed last year, yellow flags and unlighted marker lamps being permitted as alternatives to the usual green flags for day indications, and yellow as well as green lights at night. It was then decided unanimously to re-submit to the 1915 convention the three rules covering the display of classification signals that were submitted in the 1914 report to take the places respectively of present rules 105, 106 and 107.

In connection with a subsequent discussion as to the advisability of displaying flags by night as well as lights, it was decided to follow present customary practice on interurban railways, and to omit flags by night, lights only being displayed.

The matter of the use of the flagging rule on block signalled roads in cases where communication with the dispatcher could not be established, as referred to the committee by the 1914 convention, was then taken up. Mr. Collins read a number of replies to a letter that had been sent by the committee asking for opinions from electric railway operators. It was moved by Mr. Dana to appoint a sub-committee to confer with the block-signal committee regarding the modification of rule 554 now in the standard code of block signal rules. This sub-committee was instructed to draft a new form for the rule for the information of the block signal committee and to submit it by mail for the consideration of that committee. The sub-committee was instructed also to consider possible further modifications in all of the block signal rules. Chairman Collins appointed to this sub-committee Messrs. Palmer, Morgan and Greenland.

J. W. Brown of the committee on block signals then presented a statement from the block signal committee regarding the contactor signal rule No. 10, as submitted at last year's convention. This statement included letters from the signal manufacturers, whose opinions were divided. It was decided to send copies of the correspondence to the members of the newly-appointed sub-committee on block signal rules for their consideration and action on the matter.

Mr. Morgan then moved to re-submit at the next convention the modified form of present rule 159 that was proposed in the 1914 report of the rules committee. This was carried.

It was then decided to have published a statement that the rules committee was prepared to pass upon questions of interpretation of the standard rules that might arise on the lines of member companies, in accordance with the resolution to this effect passed at the last convention.

The committee referred to Secretary Burritt the work of compiling and analyzing operating rules that have been established by the various state commissions and also asked him to report upon the number of railways that have adopted the standard rules of the association since the 1914 convention. The committee then took under advisement the request of one of the member companies to pass upon the scope of an order that had been issued on one of its lines to cover a specific train movement, and after discussion a detailed reply was formulated and submitted to Secretary Burritt for transmittal.

JOINT COMMITTEE ON ENGINEERING-ACCOUNTING

A meeting of this committee was held at the rooms of the Railroad Club of New York, 30 Church Street, on Feb. 5. Those present were C. R. Harte, New Haven, Conn., chairman; F. H. Sillick, New York, co-chairman; C. H. Clark, Cleveland, Ohio; M. W. Glover, Mobile, Ala.; C. H. Lahr, Akron, Ohio; R. J. S. Pigott, New York, and J. P. Ripley, New York. After general discussion to determine the best possible organization the following members were assigned as sub-committees to consider the subjects indicated: To draft a set of standard forms for use with the system recommended by the 1914 committee; J. P. Barnes, Rochester, N. Y., chairman, and Messrs. J. C. Collins, Rochester, N. Y., Lahr and Clark. To revise sub-division of operating maintenance accounts to meet the new Interstate Commerce Commission classifications; F. H. Sillick, New York, chairman; and Messrs. Harte, Ripley and H. A. Gidney, Boston, Mass. To develop a proper ledger for the maintenance of a continuous inventory; F. H. Sillick, chairman; and Messrs. Clark, Glover and Martin Schreiber, Newark, N. J. A general discussion on the broader phases of the subject followed the appointment of committees. The sub-committee on the continuous inventory ledger was scheduled to meet the following day and the other sub-committees were to meet on early dates.

COMMITTEE ON PASSENGER TRAFFIC

This committee, of which P. P. Crafts, Davenport, Iowa, is chairman, has sent out a form for collecting data on one-man car operation, on the effect of the use of automobiles on interurban and suburban passenger traffic and on the motor bus and trackless trolley. The last named does not include the so-called "jitney" bus, which is to be covered in another data sheet. More than fifty main topics are considered, some of these being divided into many sub-topics. The committee wishes full information concerning the extent of one-man car operation, the conditions under which such cars are operated and the results secured. The proposed analysis is very thorough and includes all factors even to details of car arrangement and alterations made in old cars when such were adapted to fit the new service. Opinions are requested as to the effect of the use of automobiles on passenger traffic with details of the methods followed in studying the situation. The motor bus and trackless

trolley situation is taken up to determine the effect on trolley lines of the use of these vehicles, especially as to whether the buses act as feeders or as competitors.

PUBLIC SERVICE COMPANY SECTION

The regular meeting of Company Section No. 2 was held in Newark on Feb. 18. In accordance with the program outlined in last week's issue, page 337, the topic of the meeting was electric railway promoting and financing. L. D. H. Gilmour, general solicitor of the company, summarized the history of New Jersey laws under which electric railways are incorporated and enumerated the steps involved in promoting and incorporating a project. He illustrated some of the difficulties of such work by relating several humorous personal experiences. He showed by census returns that, in northern New Jersey, Public Service serves a population of two millions and at the assured rate of growth due partly to nearness to New York, a good future is before the company.

H. C. Donecker, assistant general manager, prefaced his paper with an excellent summary of the benefits of company section activity to the men and their employers. He emphasized the Public Service motto, "Safety, Courtesy, Loyalty." He then contrasted old and new methods of corporation financing, defining clearly such terms as bond, stock, mortgage, car-trust certificate, discount, bonus, "water," etc., and concluded with an explanation of the details of the Board of Public Utilities' supervision of electric railway financing.

MANILA ELECTRIC RAILROAD & LIGHT COMPANY SECTION

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 13, page 337, some details of the organization of section No. 5 were given. The first meeting, held on Dec. 15, was a great event in the community. The attendance was over 500 and the meeting was held in the roof garden on the Company's building, which compares favorably with any roof garden in New York.

L. L. Vincent, superintendent of electrical testing, presented a paper on "The Future of Electricity in the Philippines." He first outlined the history of the development of electric lighting and of the telephone and the telegraph, and then analyzed the conditions in the islands as they relate to the use of electricity. In his opinion there appears to be little prospect that the power business will be much more than a by-product of the lighting business for some time to come. He urged the development of the water powers, with government aid if necessary, as a factor in the economic independence of the country and showed the relation of this to electric railroading. He said also "that electrical transportation awaits that condition of intense commercial activity when a people has already amassed wealth, and can afford expensive machinery for applying it," implying thereby that the future of the electric railways in the Philippines will keep pace with the industrial growth of the country.

In closing the discussion C. N. Duffy, vice-president, outlined the relative status of railways, lighting and power in the United States and took a different point of view from that of Mr. Vincent with respect to the future of the local power business.

The executive committee has appointed the following chairmen of committees: Membership, F. J. Tew, superintendent of shops and carhouses; program, C. E. Haywood, superintendent of track; reception, Jerome Grindstaff, inspector transportation department.

MANUFACTURERS' ASSOCIATION

A committee consisting of W. F. Cutler, chairman, E. J. Clark, Edwin B. Meissner and A. S. Partridge, attended the National Foreign Trade Council Convention held recently in St. Louis. The chairman reported that Secretary McConnaughy's office would be furnished promptly with a report of the discussion on foreign trade conditions, to be filed for the use of members.

Another committee, consisting of C. C. Peirce and H. G. McConnaughy attended the third annual meeting of the Chamber of Commerce of the United States in Washington. They call attention particularly to the papers by the Argentine ambassador, Hon. R. S. Naon and Vice-President McRoberts of the National City Bank of New York. The former suggests to manufacturers the desirability of initiative in sending at least small cargoes to Argentina, and especially of their adapting themselves to the custom of not demanding payment on delivery. Mr. McRoberts made a clear statement regarding the practical possibilities of financial investments abroad, showing remarkable opportunities for American manufacturers. Full reports of this meeting will be sent to the members of the association.

COMMUNICATIONS

Important Factors in Steam Railway Electrification

PHILADELPHIA, PA., Feb. 5, 1915.

To the Editors:

Mr. Murray's presentation of the electrification problem, as abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 30, 1914, is most interesting, especially as figures are given for the various costs. These are likely to prevent any careless assumption that electrification should be introduced indiscriminately but that each problem must be studied in connection with its own environment.

Mr. Murray states that the success of electrification is entirely dependent upon density of traffic, but the writer thinks that uniformity of traffic is equally important, otherwise the power plant must be large enough to take care of the occasional "peak loads," and the average load factor may be so low that the savings in operation will be more than overcome by the excessive overhead charges. This was demonstrated several years ago in connection with the New York Central electrification, which showed a saving over steam operation, but if a greater variation in the load had entailed a power plant of twice the size, the economy of operation would have been in favor of steam locomotion.

In the discussion of this paper at the Franklin Institute meeting it was stated that the fuel comparison was made with the former saturated steam locomotives, so that modern superheater engines would probably use only one and one-half times as much coal as the electric power plant, instead of twice as much for the same power at the drawbar. This will very considerably affect the comparison.

In considering the cost of equipment and installation, it is stated that electric and steam locomotives for suburban service would cost about $40,000 and $15,000 respectively, and that for every electric engine purchased the railroad would be justified in making a capital investment of $40,000 to cover cost of power plant and transmission equipment. As the latter depends largely upon the mileage operated, it is evident that a great difference due to environment would exist between a road, like the New Haven with about 1½ miles of track per locomotive, and another, such as the Northern Pacific with 4½ miles to each engine. In the latter case the capital investment per locomotive would be about 50 per cent greater than in the former case. Such an applica-

tion to terminal yards would be very costly, as the proportional mileage would be even greater.

In pleading for conservatism in these matters, Mr. Murray shows that he has a clear conception of the costs and difficulties in the matter of financing, and does not claim the unconditional advantages assumed a few years ago by some electrical experts, regardless of the local conditions and environment of the properties to be electrified.

GEORGE R. HENDERSON, Consulting Engineer.

Starting Resistance for Railway Motors

NEW YORK, Feb. 16, 1915.

To the Editors:

I have read the article by Professor A. M. Buck, appearing in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 13, 1915, page 330.

I find this study very interesting, especially the graphical solution, which gives a clear idea of how the *IR* drop subdivides itself between motor and external resistance and also shows the variation of the rather elusive counter-emf. A further merit of this study is that it explains clearly how to produce a good equivalent of the saturation curve, which is very seldom in the hands of the railway engineer not connected with the manufacturing concern. A glance at this substitute, which is defined as the "tractive effort per ampere" curve, reminds one of another very familiar curve, the usual speed characteristic curve as it would appear if turned upside down. In fact, it would be easy to demonstrate that if the efficiency of the motor were constant the ordinates of this curve would be proportional to the reciprocals of those of the speed curve. As it is, the variation of the efficiency, which is not very great between the ordinary current limits, alters somewhat the reciprocal relation.

The foregoing consideration is made to point out how this solution to determine the starting resistances, although absolutely different from mine published in the ELECTRIC RAILWAY JOURNAL of Dec. 26, 1914, has, however, some points in common with it. In Fig. 2 of Professor Buck's article the lines of voltage drop correspond to the speed lines in Fig. 6 of my article. Again, in his Fig. 2, we might consider the lines *A'B*, *B'C*, etc., to be corrections of the counter-emf corresponding to corrections in the speed factor in my construction.

As to the practical use of Professor Buck's method, the graphical solution as given is indeed of very simple character and general use, but it saves but a small part of the work required to reach the final determination of the resistances. In this problem the graphical solution is there to check up the final results and to give the first hint as to how the resistance steps are to be chosen. It would require good luck indeed to strike at once the values of resistance which would serve equally well for series and parallel. The fact is that, after having obtained a satisfactory arrangement either for series or for parallel only, we have first to calculate the resistances of the resistors per motor for the position considered, series or parallel, and then to check up to see if the resulting resistances per motor for the other position are acceptable. This operation will very likely have to be repeated. Hence, what we need is not only a simple graphical solution but also simple and quickly usable formulas connecting the data of the figure with the resistances which we wish to determine.

In my method I use $R = (\alpha - 1)\, r$, which is simple enough. In Professor Buck's method the graphical solution gives only voltage drops and counter-emfs, thus saving only part of the work to solve for the values of R in the formulas.

F. CASTIGLIONI.

The Sale of Scrap Metals

PITTSBURGH RAILWAYS COMPANY

PITTSBURGH, PA., Feb. 5, 1915.

To the Editors:

The article in your issue of Jan. 23, 1915, on the "Sales of Scrap Metals" is one which is of particular interest to me, and it seems is entitled to much thought and study by every one who handles such business for any company.

The article states that the average scrap value of copper and brass sold during a period of four years, ending 1911, was 20 cents per pound. There would seem to be some unusual condition surrounding the sale of scrap where such prices were paid, since the average price per pound of new electrolytic copper during the four years mentioned was $.12985, New York, according to the statistics of a national authority. Your readers would undoubtedly be interested in knowing how such prices can be obtained.

The sale of scrap metals at regular intervals is equivalent to a practice by a steel mill or brass foundry of making its purchases of new or scrap metals at regular intervals during the year without regard for the market conditions. If the whole country were canvassed, I doubt whether it would be possible to find any concerns who would do such a thing.

The brains of the organization will be found studying the problem and taking advantage of the market to increase the profits. The scrap dealers make their living by taking advantage of the varying market conditions.

Even though the sale of scrap material is merely an incident to the operation of a transportation company, and inefficiency in this regard would not mean success or failure to the same extent as with a foundry, for instance, yet it is just as important for an electric railway to exercise the brains of its organization in handling such business and taking the profits.

We have observed that with some companies the sale of scrap materials is handled by one who is unfamiliar with the subject, who, himself, has no knowledge of the materials, how it can be assembled and graded to bring the best prices. Some companies large enough to have a considerable accumulation of scrap materials still adhere to the old-time practice of selling "mixed scrap"—meaning that no attempt is made to assort it according to the standard classifications, which specify the grading most convenient for the mills. Where it is not properly assorted it is usually impossible to sell to the mills. The scrap dealer who buys it grades as he loads it or ships the indiscriminate mass to his yard and grades it there. For all of which the company selling the scrap must pay in reduced prices.

There is such a diversity of practice, which is not wholly the result of peculiar local conditions, that it would be interesting to have a discussion through the columns of your journal on this important subject.

Many five-cent fares can be saved right at the scrap pile.

B. J. YUNGBLUTH, General Storekeeper.

[NOTE—In answer to the inquiry in Mr. Yungbluth's letter, Mr. Alexander says that the price of 20 cents in his article in the issue of Jan. 23, referred to copper scrap only.

He states that this was obtained as an average during a six months' period of reconstruction by a medium-sized electric railway in the year mentioned, owing to the high price of copper at that time. He says that the figure was given to indicate the desirability of being able to arrange and carry out sales quickly to take the advantage of good prices that might prevail temporarily.—EDS.]

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Equipment Defects—Controller Reverse Drums and Interlocking Mechanism

BY C. W. SQUIER, E.E.

Reverse Drums.—The most common form of controller reverse drum consists of a wooden cylinder with the necessary copper contacts mounted on it and fastened with screws. Some of the later types of controller have reverse drums made of a molded insulating material and have the contacts molded in place. This is a much better construction as it does away with the trouble of loose contacts due to the working out of screws. The principal argument against its general adoption is that the entire drum has to be replaced whenever the contacts become excessively worn or burned. The wear on the reverse contacts is very small, however, due to the few operations of the reverse drum as compared with that of the main drum. Hence the contacts do not require frequent renewal. As the circuit is never opened on the reverse drum the only cause for burning of the contacts is insufficient pressure of the fingers for carrying the motor current or poor contact between the fingers and their contacts. By proper care of the fingers excessive burning will be prevented and the life of the molded reverse drum thus made equal to that of the wooden drum with less liability to short-circuits.

A type of reverse drum built up of insulating bushings fitted to a shaft and held in place by a clamping nut was developed several years ago. While this type has not come into general use, it has an advantage over the molded cylinder in that the contacts can be easily renewed without the necessity of replacing the complete drum, as the contacts consist of punchings clamped between the bushings.

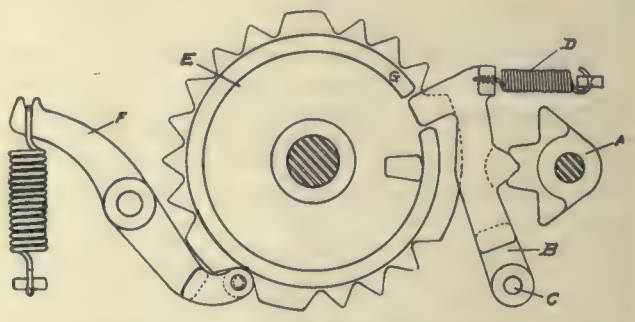
Aside from contact troubles, the difficulties experienced with reverse drums are very few. The drums sometimes become loose on the shaft due to wear on the pins or drum but this is overcome by more frequent renewal, and short-circuits sometimes occur due to the accumulation of oil and dirt on the surface of the drum. Whenever a short-circuit does take place the drum is usually destroyed as no provision is made for opening the circuit on these drums.

Interlocking Mechanism

Controller power and reverse drums are so interlocked that the reverse drum can be thrown only while the power drum is in the "off" position, and the power drum can not be operated while the reversed drum is in the "off" position. This interlocking prevents the opening of the motor circuit on the reverse drum, as it is necessary to shut off power by throwing the main drum to the "off" position before the reverse drum can be thrown.

One form of interlocking mechanism for a railway controller is shown in an accompanying illustration. The star wheel *A* is pinned to the reverse drum shaft, so that any movement of this drum operates the reverse pawl *B*, which is pivoted at *C* and held in contact with the reverse star wheel by the spring *D*. The main star wheel, which is shown at *E*, is pinned to the main or power drum shaft. *F* is the main pawl, and its function is to make certain that the main drum is stopped only on the operating points of the controller, and not between notches, by the roller at the end of the pawl riding into the different notches of the star wheel. This insures a quick movement in passing from notch to notch and also enables the motorman to feel when he has the controller drum on the various points.

The mechanism as drawn shows a position with both the power and reverse drums in their "off" position. It is seen that the upper end of the reverse pawl *B* fits



DETAIL OF INTERLOCKING MECHANISM

into an opening in the rib *G* of the main star wheel to lock the main drum against turning. By throwing the reverse drum to either the "forward" or "reverse" position the pawl fits into a deeper notch of the reverse star wheel so that the end of the reverse pawl is withdrawn from the opening in the rib of the main star wheel, and the main drum can then be rotated. As soon as the main drum has been moved from its "off" position, however, the rib *G* on the main star wheel prevents the reverse pawl from moving far enough to permit throwing the reverse drum. The drum is then locked against turning.

Troubles with the Interlocking Mechanism

The principal troubles experienced with the interlocking mechanism are broken pawl springs and loose star wheels. Most pawl springs break at the first turn from the end. This may be due to improper material or manufacture, or to the method used in installing the springs. The end loops of the springs should be made with a sufficient opening so that these loops may be readily hooked into the eye of the pawl or stationary post where this method of fastening is used. Where the end loops are entirely closed it is necessary to open them when the springs are installed. The usual practice is to open the loops with a pair of pliers or a screw driver, hook the end into the eye and then close the loop slightly again. This is liable to start a fracture in the spring which will ultimately cause it to break. All springs should be made with a large radius curve between the loop and the first turn as sharp bending at this point is often the cause of their breakage later.

When installing springs after the loop has been hooked into the eye, it is necessary to stretch the spring in order to fasten the other end. This is usually done by one of the following methods: By using a pair of

gas pliers around the spring, by gripping the loop with a pair of pliers, by using a screwdriver as a lever through the loop, by forcing a screwdriver between the turns of the spring or by using a wire or cord through the loop of the spring. Where the last method can be used, it is the best because it is least liable to injure the spring. Some controllers are so constructed, however, that it is next to impossible to install a spring without straining it.

In a number of cases, I have found that a slight change in the stationary spring post will permit easier and quicker installation of the springs. The practice of forcing the point of a screwdriver between the turns of the spring and then using this as a lever to stretch the spring is very bad. This is sure to force the turns apart, so that they will not close again, thus weakening the spring. The turns at this point suffer a severe strain as well.

I have seen controller men use a blow-torch to take the temper out of the springs to make them easier to install. They were also under the impression that it was the tension that caused the springs to break, and that by taking the temper out of them the troubles due to breaks would decrease. It is needless to say that such a spring is worthless in a short time because it takes a permanent set too readily. The best design of interlocking mechanism is one in which all the parts are carried on the controller cap plate, so that when this is removed the entire mechanism is open to inspection, and any necessary renewals can be made quickly and easily at the bench.

Car Life of Plain Curves

BY M. BERNARD, ASSISTANT ENGINEER WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM

Not many data seem to be published concerning the life of open-hearth steel rails in comparison with manganese steel rails located in curves. For this reason the following service study may be of interest to other way engineers.

The curves in question are located under the Brooklyn Bridge deck near Fulton and Tillary Streets, Brooklyn; the inner (east-bound) curve is at the foot of a 4.5 per cent grade while the outer (west-bound) curve is located practically in a horizontal plane.

EAST-BOUND PLAIN CURVE

Installed	Construction	Renewed	Life	Number of Cars
December, 1907	70 lb. A. S. C. E.	April, 1909	1 yr. 4 mos.	750,000

Running rail with guard of same section.
Open-hearth steel.
Estimated cost of 1907 installation, $600.

RENEWAL OF EAST-BOUND PLAIN CURVE

Installed	Construction	Renewal	Life	Number of Cars
April, 1909	80 lb. A. S. C. E.	Probably July, 1915	6 yr. 3 mos.	3,525,000

Manganese steel double-web section for inner rail as shown in sketch.
Open-hearth steel 80-lb. A. S. C. E.
Running rail with bolted-on rolled guard for outer rail.
Estimated cost of 1909 installation, $1,600.
Inside radius of middle portion of this curve, 37 ft. 7½ in.

WEST-BOUND PLAIN CURVE

Installed	Construction	Renewed	Life	Number of cars
December, 1907	70 lb. A. S. C. E.	June, 1911	3 yr. 6 mos.	1,290,000

Running rail with guard rail of same section.
Open-hearth steel.

Installed	Construction	Renewal	Life	Number of Cars
June, 1911	80 lb. A. S. C. E.	Probably March, 1916	4 yr. 9 mos.	1,750,000

Open-hearth steel.
Inside radius of the middle portion of curve, 47 ft. 7½ in.

The foregoing comparison will give an approximate idea of the relative values of weight of rail and kind of steel in curves. It shows also the influence of grade upon the life of curves.

Maintenance of Cars at Rome, Ga.

BY A. WADE, MASTER MECHANIC, ROME (GA.) RAILWAY & LIGHT COMPANY

We operate five equipments of 12-A motors, one 92-A, two 101-B, one GE 52, one GE 54, six GE 67 and four GE 219. All of these motors are mounted on single trucks, with cars averaging 11½ tons in weight. The data follow:

	1913	1914
Total car-miles	607,100	627,428
Total cost of maintenance of cars	$8,892.78	$8,176.48
Total maintenance of cars per car-mile, cents	1.465	1.303
Total cost of oil for cars and truck curves	$153.61	$151.97
Cost of oil per 1000 car-miles, cents	25.31	24.22
Average mileage made by 33-in. chilled iron car wheels	46,700	39,214
Average energy required to operate cars per ton-mile, watts	143.0	135.9
Derailments	56	33
Car failures	10	7

The low wheel mileage in 1914 was due to several broken axles, which prevented the wheels on such axles from being used up to the limit of their useful life.

In the item of "car failures" we have listed only the car failures that were serious enough to delay the schedule ten minutes or more.

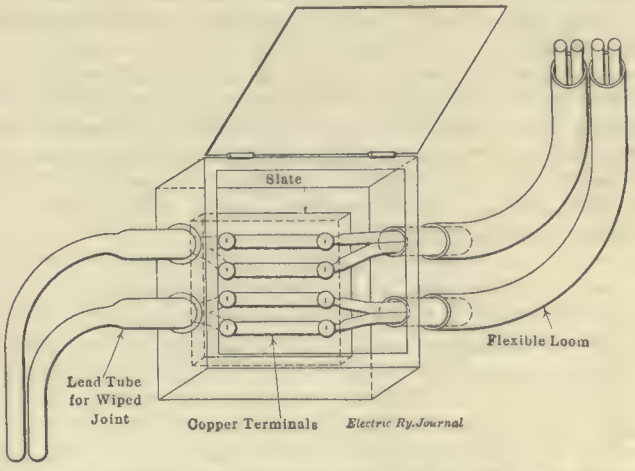
In the item of "average energy required to operate cars per ton-mile" we have metered, at the d. c. busbars at the power house, the entire kilowatt hours required to operate the motors, heaters, interior lighting, arc headlights, and we have also included the line losses.

A Home-Made Junction Box

BY J. G. KOPPEL, ELECTRICAL SUPERINTENDENT OF BRIDGES, SAULT STE. MARIE, MICH.

The accompanying illustration shows a home-made junction box, installed between paper-insulated, lead-covered and extra flexible rubber-insulated loomed cables.

A short time ago a steam drive for a drawbridge



JUNCTION BOX INSTALLED ON CENTER PIER OF DRAWBRIDGE TO CONNECT STRAIGHT RUN AND FLEXIBLE CABLES

was replaced by an electric motor. The cables for the motor energy supply were installed underground in clay ducts and the ends were run up the center pier of the bridge. From the base of this center pier a coil of extra flexible, rubber-insulated and loomed cable was run, so arranged that when the draw swings out the coil will unwind, and when the draw swings in the coil will rewind. The problem, however, was to find a suitable junction box which would permit the lead-covered cables to stay in place permanently while the flexible cables could be disconnected after due wear without breaking a costly wiped joint.

Several catalogs were examined for a suitable pothead but without success, because the clearance between the steel and the masonry was too small to permit the use of a standard pothead. The problem was solved by making a steel box with a hinged and rubber-gasketed cover into which was placed a slate slab cut from an old switchboard and drilled for four copper terminals, with thumbscrews on each end of the terminal. On one end of the box two lead sheaves were soldered to take the lead-covered cables and to make a wiped joint, while the other end of the box was fitted with two iron-pipe nipples to take the loomed cables. Lugs were put on the cable ends and secured to the terminals, after which the box was filled with hot ozite compound. The job was finished by coating the outside of the box with weatherproof paint.

Maintenance Costs—Reducing Handling of Equipment and Departmental Co-operation

BY H. A. LEONHAUSER, ASSISTANT SUPERINTENDENT ROLLING STOCK AND SHOPS UNITED RAILWAYS & ELECTRIC COMPANY, BALTIMORE, MD.

Much has been said and published in the past two or three years in regard to maintenance costs of railway equipments, while but little has been published as to the enormous saving that could be effected by proper schedule speeds, proper car spacing, proper handling of equipment by the platform men, especially the motormen, and proper co-operation of the several departments; namely, transportation, power and overhead line, maintenance of way and purchasing.

The operating department as a rule endeavors to bring its receipts per car-mile up to the highest standard. In order to accomplish this it generally does three things: first, reduces the running time, which, of course, means greater speed; second, reduces the lay-overs, and third, lengthens the headway, which means increased capacity and weight of car. The first means that the equipment is called upon to withstand conditions for which it was not designed; namely, the improper handling by the operator; the second and third mean the overloading of the motors, axles, springs, etc., thereby increasing the maintenance costs decidedly, to say nothing of the possibilities of increasing the troubles of the claim department as well as loss of revenue due to the inability of the conductor to collect all fares.

There is not the slightest doubt in the minds of those who are in charge, or those who have studied maintenance costs, that a saving of at least 25 per cent can be effected by the proper schedule speed, spacing, and, above all, the proper and careful handling of the equipment while in service. There is a great difference in motormen. Some take an interest in the equipment generally, which means not only an enormous saving but adds much to the safety and comfort of the riding public, while others do not take the proper care and interest. It is the men in the latter class who are responsible for many failures, delays and increased costs generally. It is not uncommon to see a motorman operating a car with the controller on the proper running notch either in series or in parallel with the brakes applied. If we stop to analyze this particular "stunt" to find out what it means we can readily see without the slightest doubt how it increases the maintenance costs.

Improper Controller Manipulation with Brakes On

First, improper controller operation with brakes on means the overloading of the motors. This causes a decided rise in temperature, which means deterioration of the insulation and consequent burn-outs of armature and field coils, burning off of leads, and the flashing at the brushes, which frequently extends to the motor frame, melting a portion of the brush-holder as well as the spring. The last trouble leads in many instances to controller explosions which, in turn, add to the troubles of the claim department. Further unnecessary and frequent blowing of the circuit breaker increases the maintenance costs of that part of the equipment and also disturbs, even if it does not frighten, the passengers. In cutting out the controller a much heavier current is broken, and when we consider how often a controller is cut out in a day (to say nothing of a year) we can readily understand how this cutting out increases the cost due to excessive burning of the fingers, tips, contact plates and arc dividers. These troubles also lead more or less to controller explosions.

If the motorman dwells on the resistance points under the conditions aforesaid the resistors reach a red heat in a few moments, causing the mica tubes to break down and the grids to warp; the same result applies particularly to grades without the brakes applied. It is far better on steep grades to bring the car to a stop and then start up with the controller on the series notch or running point, rather than to cut in and out continually. The latter action not only makes resistance defective in time but is severe on gears and pinions.

Second, the application of the brakes with the power on means the grinding away of brakeshoes and wheels. Both are very expensive items, wheels especially so. It has been my good fortune, as well as duty, to inspect all worn-out wheels in this city for many years. It is appalling to one who has had years of experience in the inspection of cast-iron car wheels to see so many relegated to the scrap heap, when they should have given approximately from four to six months' further service; or in other words from 12,000 to 20,000 miles more.

Running Over Special Work

Third: "Run slow through switches, curves and over crossings" is a splendid rule. What does this rule mean? It means that we would have very few broken or bent trolley poles, bent trolley wheels, broken or torn-off trolley boards, and last but not least, damaged hoods. What does it mean to the overhead line department, and still more, what does it mean to the maintenance of way department? In so far as the latter department is concerned, the passing or running over crossings or special work soon hammers them out of shape, bringing or diverting the trouble again to the car equipment, resulting in bent axles and chipped and broken flanges. Passing or running through switches too rapidly very often causes the rear wheels or truck to jump the switch. This generally means considerable damage and expense to the equipment, to say nothing of the possibility of disabling the car by breaking off motor leads, etc., or of bending the brake rods.

Correct Use of Air Brakes

Further, the proper and careful handling of air brakes means a great reduction in maintenance costs to those in charge of the equipment. An air brake is really a luxury and should be looked upon as such by all motormen. To stop an ordinary 42,000-lb semi-convertible car in city service under average rail conditions, two applications, or two movements of the valve, are sufficient. Yet in many cases motormen make from four to six applications, thereby wasting from 50 per cent to 60 per cent of the air. This increases the maintenance considerably, due to the grinding in, or scraping, of the valve parts. In short, wasting air means increased energy consumption, as well as increased maintenance costs for the electrical and mechanical parts of the compressor, for the governor, brake cylinder, brake levers, rods, pins,

wheels and shoes. One more point is the heavy shock that is transmitted to the transom bars by failure to exhaust the air to make a smooth and even stop. This adds appreciably to the maintenance account, to say nothing of the inconvenience to passengers, especially to those who are standing.

FLAT WHEELS

The question of flat wheels is another item that is directly in the hands of the motormen as one which not only increases maintenance costs decidedly, but also brings into play the wheel grinder with costly carborundum wheels and expensive energy or truing shoes, to say nothing of rail corrugations. Another point which should be kept before the motormen is that flat wheels not only pound and loosen bolts, but are detrimental to the equipment generally. They also lead to complaints from the public, and officials of the company know where these complaints generally end.

STORMS

Operating and drifting through water slowly and carefully again depends upon the judgment of the motorman. Lamps should be turned on at the beginning of an electrical storm. The spinning of the wheels during a snow storm may be avoided by the proper feeding of the controller as well as the use of a little sand at the right time.

DAMAGES

Motormen as a rule believe that the angle-iron bumper will stand all sorts of abuse, simply because it is called a bumper. When they bring cars into the carhouse, either during the day or night, they strike the bumper of the car ahead, bending both. This practice is very bad indeed, as the platform knees which support the bumper are generally bolted to the crossing and side sills by one bolt passing through each knee. The heavy bolts which pass through the end sills simply carry the platform. There should be a strict rule demanding that a small space must always be left between bumpers.

In passing vehicles, panels frequently are damaged. What the motorman terms a scratch in reality means the removal and replacement of three or four panels, together with their painting, striping, lettering and numbering. All of this spells a large sum.

Grab-handles of both open and closed cars are frequently knocked loose in passing vehicles, but at times this fact is not reported promptly, which, aside from the repair charges, makes trouble for the claim department. Passing over stones and other foreign substances causes the breakage of gear cases, with possible derailments and long delays. The motormen should be instructed to stop the car and remove the stone or foreign substance.

MOTORMEN'S DAILY REPORT

It is of the utmost importance to the mechanical department that the motormen should turn in reports properly and carefully marked covering any and all defects, promptly for each and every car that they operate at any time.

INSTRUCTIONS TO MOTORMEN

The writer does not believe in trying to crowd a lot of "stuff" into the heads of motormen. On the contrary, he believes that they should be taught a few, and only a few essential things; namely,

1. Safety first.
2. Cutting out the defective motor or motors and doing it properly.
3. The right way of placing the coupling link and pin in order to make proper, safe and quick coupling.
4. Proper braking.
5. To know when wheels are sliding or revolving.
6. To use sand on a "bad" rail while wheels are revolving in making a stop.
7. To cut in and out the controller as little as possible.
8. To drift as much as possible and use the brakes as little as possible, and to use the reverse only to avoid an accident.

DEPARTMENTAL CO-OPERATION

The writer is a firm believer in the old adage, "People living in glass houses should not throw stones." Therefore he will go after the rolling stock and shops department first.

It is of the first importance to design a car that will properly meet the requirements of city service and appeal to the public. The writer has always maintained that the single-truck car is the only car for city service, and that a modern, comfortable car body of the pay-within semi-convertible type seating forty-two people would earn the largest dividends. Let us see from the following comparison whether this statement is correct:

SINGLE-TRUCK CAR (SEMI-CONVERTIBLE)		DOUBLE-TRUCK CAR (SEMI-CONVERTIBLE)	
Cost, approximately	$2,700	Cost, approximately	$5,200
Seating capacity	42	Seating capacity	42
Weight, approximately, pounds	22,000	Weight, approximately, pounds	42,200
Trucks	1	Trucks	2
Wheels	4	Wheels	8
Axles	2	Axles	4
Journal bearings	4	Journal bearings	8
Journal boxes	4	Journal boxes	8
Brakeshoes	4	Brakeshoes	8
Gears	2	Gears	4
Pinions	2	Pinions	4
Motors	2	Motors	4
Trolley base	1	Trolley bases	2

In addition to the foregoing we must consider that the differences in the design of the controllers and in the number of brake levers and brake parts also favor the single-truck car most decidedly. Again the difference in energy consumption, feeder distribution, the pounding of crossings, maintenance of all special track work, etc., must also be taken into account. Other items may also be added. Finally, when it is considered that a car runs nineteen hours on an average all-day schedule and that for fifteen of those hours a single-truck car would carry all of the passengers without inconvenience, leaving a few extra single-truck trippers to take care of the rush-hour surplus, it is only fair to conclude that the single-truck car eventually will replace the double-truck car for city service. In fact, the writer can see no other answer, since both labor and material have increased steadily for the past twelve years, while the nickel must carry people further than ever.

POWER AND OVERHEAD LINE DEPARTMENT

Increases in rolling stock costs in a great many instances are brought about by high voltage playing havoc with the older types of equipment, and picking the "bugs" out of modern equipments, especially at or near substations. Numerous brush-holder troubles and controller explosions have been due to this cause. On the other hand, low voltages lead to the heating of the motors and compressors, the burning of the governor contacts and to low air pressure, which is followed by bad braking.

The failures and damages due to bad alignment of the trolley wire or slack wire and malleable-iron frogs are as follows: Badly bent and twisted trolley poles, broken hoods, and trolley boards torn from the roof of car. In many instances the use of a malleable-iron frog is responsible for pitted wheels. Such wheels arc, causing the burning of the trolley wire and the early scrapping of the wheel itself.

MAINTENANCE OF WAY DEPARTMENT

Having had the opportunity of inspecting and passing on all worn-out or defective wheels for the past

ten to twelve years in our city, I have reached the conclusion that a girder-grooved rail is very expensive from the standpoint of both cast-iron and steel wheels, owing to the fact that it causes very irregular flange wear. Cast-iron wheels particularly are frequently relegated to the scrap heap for this reason. Loose and broken crossings, as well as loose switches, are responsible for many chipped flanges, especially on pilot wheels, and are liable to cause derailments which lead to damages to the electric equipment, car body and brake rigging generally. In both instances the mileage of the wheel is greatly reduced. Broken tie-rods and badly-worn crossings, especially steam railroad crossings, are responsible for many bent axles; the former are responsible for the sudden swerving of the car, especially a single-truck car; the latter are due to the hard jolt. The flat, square flanges caused by badly-worn rail necessitate the removal of the wheels while they still possess plenty of chill and mileage. Badly-worn rail also leads to the rapid destruction of both bodies and trucks.

PURCHASING DEPARTMENT

The purchasing department can be of invaluable assistance to the rolling stock and shops department by keeping in close touch with the superintendent of that department and his assistants. This is absolutely essential for the following reasons: To combine quality with price; to inform it about the performance of the material that has been purchased; to maintain at all times an adequate stock of repair parts; to promote better deliveries. It is also absolutely necessary that reliable, intelligent men should be selected to assist the storekeeper to keep up a regular and legitimate stock of all standard supplies. To be out of supplies means very often the shopping of the car or cars, or else their temporary retention in service before going to the shops. Then the cost of renewing or replacing the part or parts is much higher because the difficulties have increased. Volumes could be written on this subject, but the fact still remains that in order to assist the rolling stock and shops department to operate economically it is necessary for the purchasing department to bear in mind the following:

1. Have reliable and intelligent help.
2. Eliminate the stories "just out," or "it has been shipped," etc.
3. Get the best at the best price.
4. Secure prompt deliveries (no fake promises).
5. Keep up your stock and save us from losing our religion.

CONCLUSION

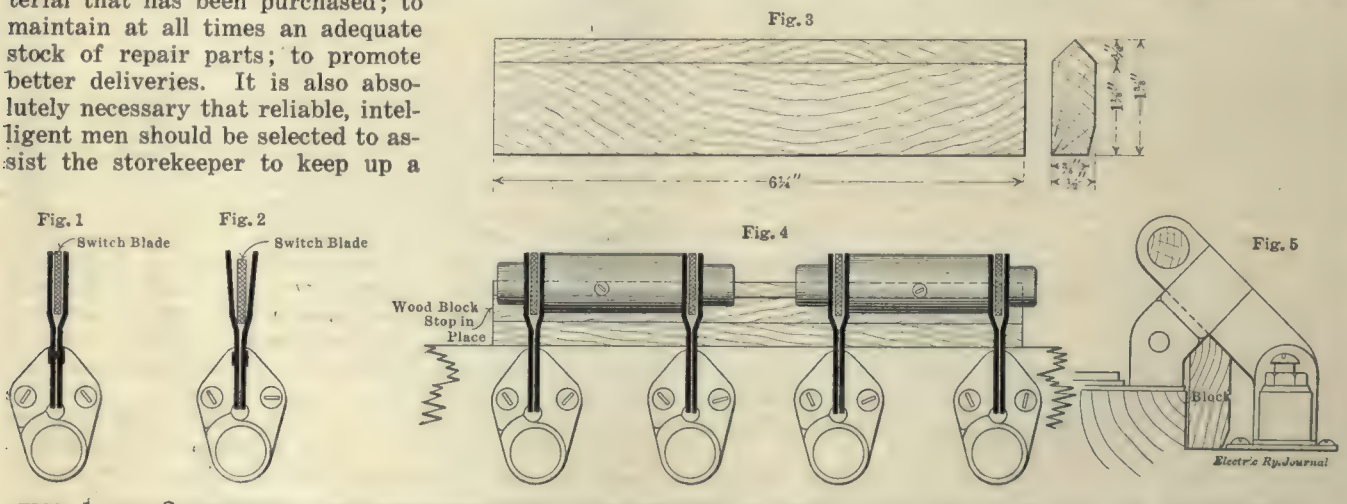
The writer has tried to show in a very brief manner how maintenance costs of car equipment can be reduced, aside from the rolling stock and shops department, by the co-operation of the heads of all departments and employees generally. He earnestly hopes that he has not offended anyone; not even our own gray-haired, congenial purchasing agent, who has caused him on numerous occasions to warm up considerably under the collar.

Block to Protect Switch Blades of Type K Controllers

BY R. H. PARSONS, ELECTRICAL FOREMAN

The later patterns of Type K controllers are fitted with motor cut-out switches constructed of two metal strips riveted together, replacing the older ones which were cast solid of bronze or similar composition.

After many of the common controller troubles have been eliminated by redesign, special care, etc., it will be found that a large number of controllers still give trouble from failures caused by burning or poor contact of the cut-out switches. Perhaps some careless shopman has allowed the car to go out with the blade bent or the clips out of position. Again, the motorman, in a hurry to make time, imagines that he has a grounded motor because his circuit breaker is blowing. So he cuts out first one and then the other switch, hoping to overcome the trouble. Sometimes he replaces the switches properly but often he leaves them in only partly



FIGS. 1 AND 2—PERFECT AND IMPERFECT CONTACT OF SWITCH BLADES. (ELEVATION 45 DEG. TO HORIZONTAL); FIGS. 3 AND 4—WOOD BLOCK SWITCH LEVER STOP IN PLACE; FIG. 5, APPLICATION OF BLOCK

or else uses his controller handle to drive them down hard, with the result shown in Fig. 2 instead of retaining the correct position shown in Fig. 1. The usual consequence is a poor contact which heats up the switch and melts the solder from the wires at their connections back of the terminal board.

To overcome this trouble a block has been designed constructed as shown in Figs. 3 and 4 and applied as shown in Fig. 5. This block is screwed to the terminal board under the switch blade, in which position it so limits the travel of the blade that the blade cannot be forced down to spread the contacts.

The block is made of well-seasoned hardwood and is fitted accurately. After finishing the block smoothly, it is treated like controller boards, as described by the writer in the issue of Jan. 2, 1915. The block illustrated is used in a K-27 controller. Its dimensions, of course, vary according to the type of controller used.

The Southwestern Electrical & Gas Association has increased its active membership to 125 public utilities in Texas. Its membership now includes every interurban line in the State and all but two of the street railways.

Pennsylvania Locomotive on Turntable at Panama-Pacific Exposition

One of the mammoth exhibits to be made at the Panama-Pacific Exposition will undoubtedly be that of the Westinghouse Electric & Manufacturing Company. This exhibit will include one of the Pennsylvania Railroad locomotives mounted on a turntable.

The location of the turntable is under the center of the dome of the immense transportation building at the junction of the two main aisles. The turntable is 65 ft. long, and, including the locomotive, weighs 440,000 lb. The height of the track is 12 ft. above the floor, and steel ties are used, a new type of construction for this class of work. By means of a 10 hp., three-phase, 220-volt motor the turntable is caused to revolve at a rate of once in three minutes, thus giving the crowds in each end of the building different views of the locomotive. The rotation, which can be reversed, is under the control of an operator in a booth nearby.

An unusual method of collecting the current for lighting the locomotive is employed. This was designed by the Westinghouse engineers and involves bringing the leads up through the center bearings to collector rings, thus obviating the use of third-rail shoes or trolleys. The locomotive is arranged and lighted to permit visitors to pass through it and inspect the equipment. It is clamped to the turntable by means of steel bands to prevent any possibility of its becoming dislodged.

This locomotive is said to be the largest in the world in passenger service. It consists of two units and weighs 156 tons, and is the first side-rod gearless locomotive ever placed in service. It has two motors having a total capacity of 4000 hp, and Westinghouse unit switch control equipment of the HBF type, which has made the phenomenal record of 99,549 miles per train minute delay due to power control failure. Locomotives of this type haul 12,000,000 passengers annually over the electrified terminal of the Pennsylvania Railroad from Harrison, N. J., to Pennsylvania Station, New York City. These locomotives are capable of attaining a speed of 60 m.p.h. with full load.

Other Exhibits

In addition to the locomotive, the newly-developed Types PK and HL control for railway motors will be shown in operation. These control equipments will operate motor racks equipped with 40-hp motors. The PK control operating head can be applied to any standard Type K controller.

A complete line of commutating-pole railway motors, including box and split frame types for various voltages from 600 to 1500, will also be shown, and in addition a preliminary sample of the new pressed steel railway motor.

Portable Fault Localizer

A portable fault localizer, for quickly locating a ground on a power cable, is now being marketed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The position of a ground is read directly off the dial in terms of per cent of length of defective cable. It is an application of the wheatstone bridge with all the necessary apparatus contained in one

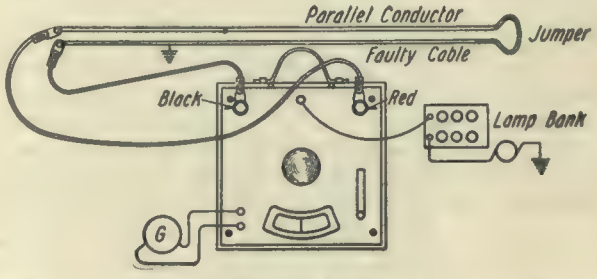


DIAGRAM OF CONNECTIONS FOR PORTABLE FAULT LOCALIZER

portable case wired for connection to the circuit to be tested. Its use assumes that the cable is grounded at only one point and that a parallel conductor of the same length and resistance as the faulty cable is available.

After proper connections are made, a dial on the instrument is revolved by means of a knob in the middle of the localizer until the galvanometer shows no deflec-



PENNSYLVANIA LOCOMOTIVE EXHIBIT AT PANAMA-PACIFIC EXPOSITION UNDER WAY

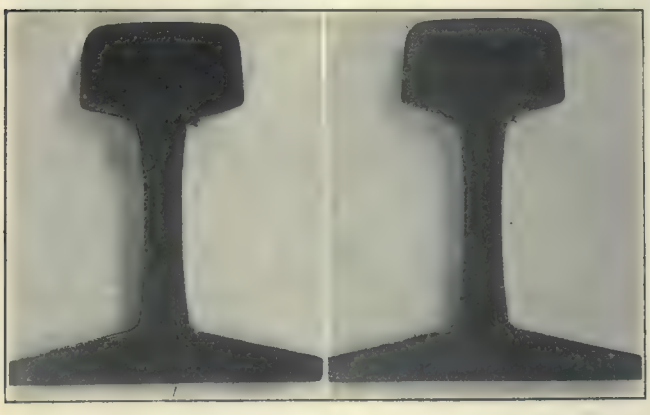
tion when the key is closed. The reading of the meter then gives the percentage of length of the feeder from the point where the test is being made to the location of the ground, assuming the total length of the feeder to be 100 per cent; the red scale indicating that the ground is on the conductor connected to the binding post marked red, and the black scale indicating to the binding post marked "Black." Direct current only is used in these tests.

The fault localizer consists of a polished wooden case which contains all the parts necessary for the test except the source of direct-current supply and the leads to the cables. Two styles are furnished, one containing a galvanometer and the other for use with a separate galvanometer. The variable resistance arms consist of two loops of low resistance wire attached to the side of a revolving disk, upon which the dial is attached, so that contact is easily made from two brushes attached to the case and connected to the galvanometer terminals. As the disk is revolved the point of contact between the brushes and the resistance loops is thus varied, as in the slide-wire bridge. The dial is calibrated in percentage of the length of the conductor tested, so that the reading is direct.

The galvanometer is highly sensitive, having a "unipivot" bearing which does not have to be leveled to take readings. It can be used for general testing wherever a portable galvanometer of its sensibility is desirable, and can easily be removed from the case when this is desired. It has a resistance of 5 ohms, full scale reading 0.00036 amp, and sensibility 0.00001 amp per division.

A Test of Vanadium Rails

Two 100-ton heats of vanadium steel for rails were recently made for the Delaware, Lackawanna & Western Railroad by the Pennsylvania Steel Company, the rails being rolled to the railroad's 105-lb. section. These heats were made according to the standard composition that was being regularly furnished to the railroad, excepting for the addition of vanadium and the reduction of from 0.10 per cent to 0.15 per cent in the carbon. The vanadium rails were required to meet the same drop test requirements as to deflection and ductility



RAIL TEST—ETCHED SECTIONS OF CARBON-STEEL RAILS FOR DELAWARE, LACKAWANNA & WESTERN RAILROAD

that are prescribed in the standard specifications of the Delaware, Lackawanna & Western Railroad, which call for a minimum and maximum deflection for the first blow.

The tests showed that, although the vanadium rails were from 10 points to 15 points lower in carbon than the standard rails rolled by the Pennsylvania Steel Company, they had about 40 per cent higher elastic limit, or useful strength, combined with increased tensile or ultimate strength. The vanadium rails also showed greater hardness. With the increased strength and hardness, they showed the same deflection under the first blow of the drop test and slightly better ductility than the carbon-steel rails.

The following table gives minimum figures obtained



RAIL TEST—ETCHED SECTIONS OF VANADIUM RAILS FOR DELAWARE, LACKAWANNA & WESTERN RAILROAD

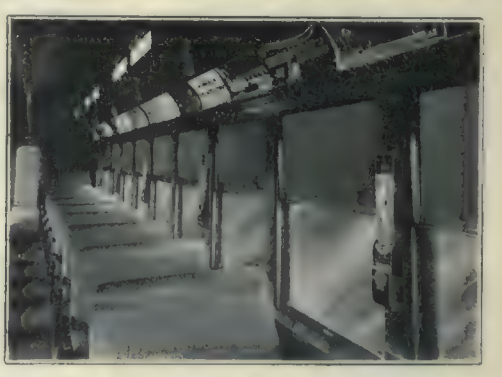
from test pieces in eight different locations in the rails from each of the heats:

	Vanadium	Carbon
Elastic limit	80,000 lb.	56,000 lb.
Tensile strength	137,000 lb.	126,000 lb.
Elongation in 2 in.	9 per cent	9 per cent
Reduction in area	14 per cent	13 per cent
Hardness (Brinell)	277	255

The drop tests were made with a 2240-lb. tup falling from a height of 19 ft. These showed deflection that were, in all cases except one, within 8 per cent of 1 in. after the first blow, and between 1.8 in. and 2.0 after the second blow. Two vanadium rails out of six in the drop test broke at the third blow.

Vending Machine for Cars of Two Pennsylvania Electric Lines

The Wilkes-Barre & Hazleton Electric Railway and the Lehigh Traction Company, Hazleton, Pa., have lately installed on their cars a penny-in-the-slot vending machine furnished by Scott E. Drum, Hazleton, Pa. These machines are of the compact design necessary for



CAR VENDING MACHINES AS INSTALLED FOR PENNSYLVANIA ELECTRIC RAILWAYS

car service, their dimensions being only 24 in. high, 3 in. wide and 2¾ in. deep. To install, the back of the machine is first attached with four screws to panels between the windows. Then the front is locked on to this back. The front has an attractive French beveled plate mirror 7 in. long and 2 in. wide, set in a frame of German silver. The machine is of metal and the finish is in mahogany. The machine is arranged to return the coin in case the article desired is out of stock.

News of Electric Railways

NEW YORK COMMISSION INVESTIGATION

A Summary Is Presented of Testimony by Commissioners Wood, Cram and Williams

Both Robert Colgate Wood and J. Sergeant Cram of the Public Service Commission for the First District of New York were the witnesses before the Legislature's investigating committee on Feb. 10. Mr. Wood was examined first. He would want to consult the legal advisor of the commission before he could state finally whether or not he believed complaints against officers of public service corporations should be turned over to the District Attorney with prison sentences if convicted of misdemeanors. He did not know that the orders of the commission were being violated by the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company until the transit bureau had brought them to his attention in December. He had spoken to Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, about the alleged violations in New York and Mr. Hedley had promised to remedy the matter.

Mr. Cram said he seldom used a city automobile before he hurt his leg, about a year ago. Thereafter the car was sent to bring him to commission meetings which otherwise he might not have been able to attend. In contradistinction to Chairman McCall of the commission Mr. Cram said three commissioners could do the work if competent men were secured. The sum of $15,000, the salary paid to each commissioner, was large, but New York was an expensive place in which to live, and really competent men could make much more money in private business. To have a really effective commission there should be a fixed tenure of office and the commission should not be made the buffet of politics. As to whether the commission was efficient Mr. Cram said that if he were asked questions he would answer. The committee could not compel him to express opinions. Mr. Cram, who is a lawyer, did not read the public service commission law the same as counsel for the committee. He kept no track of the time he spent at the commission meetings. He stayed until his work was done. The meetings of the commission were a joke. He said: "They called it a meeting of the committee of the whole. That consisted in passing judgment first and holding a hearing afterwards." He left the disposal of informal complaints to the staff, which he understood was efficient. The companies always tried to obey orders, but at times could not. The difficulty about penalty actions was that "intent" to disobey orders could seldom be shown. The companies were not "habitual lawbreakers."

At the session of the committee on Feb. 11, both Commissioners Williams and Wood were questioned in regard to the recent subway signal award. This contract was approved by Commissioners Williams, Cram and Wood. Three years ago Commissioner Wood and the president of one of the signal companies which had sought to retain him called on Chairman Willcox of the commission in regard to the signals, but they decided that it was too early to arrange details. Mr. Wood dropped the matter there and had not seen the president of the company for two and one-half years until he called regarding the new contract. Suits for infringement of patents had been threatened. He did not delay matters. At the end he was convinced by the attorneys for the Brooklyn Transit Company that a bond would cover any liability for patent litigation.

Commissioner Cram was questioned at length in regard to the operations of the New York & Queens County Railway. Colonel Hayward, counsel for the committee, read into the records a statement of the ownership of stock of the New York & Queens County Railway by the Interborough Rapid Transit Company and a comparison of the cost of operation of the power plant, cost of power purchased and yearly deficit of the New York & Queens County Railway for the years ended June 30, 1904, to June 30, 1913, inclusive.

On Feb. 13 Commissioner Williams entered an emphatic protest against the proposal to take from the commission the work of constructing the new subways and to hand it over to the Board of Estimate. Mr. Williams said that it was immaterial to him whether or not he stayed on the commission. He had done his duty, but he did not want to see a law destroyed that was so well thought of by Governor Hughes. It would be well if some means could be devised by which complaints could be disposed of more expeditiously than at present, but he denied that the informal complaints to which the committee had called attention were typical of those which were presented to the commission. Not enough had been said at the hearings about what the commission had accomplished. He intended to prepare a statement for the committee in which the work of the commission and its achievements would be set forth in detail. At the hearing on Feb. 15 Mr. Williams was questioned more particularly in regard to the adequacy of the service furnished by the Brooklyn Rapid Transit Company. The witness indulged his propensity to make speeches rather than to reply direct to questions, and the members of the committee criticised him for this. The question of more cars for the Brooklyn Rapid Transit Company was traced from its inception in July, 1911, in case No. 1438, which came up before Commissioner McCarroll. Colonel Haywood reviewed briefly the hearings, many of which were adjourned without any testimony having been taken.

The New York *Evening Post* of Feb. 12 contained an interview with Senator Thompson, chairman of the joint committee conducting the investigation, in which that gentleman was quoted as saying that the committee had made up its mind to give the State a law about the constitutionality of which there will be no question. He said the committee would be at work two weeks longer and that it would call members of the Interstate Commerce Commission.

FUTURE PLANS OF NEW HAVEN RAILROAD

The directors of the New York, New Haven & Hartford Railroad on Feb. 16 announced the plans for future operation as recently authorized by the board. These plans, which follow closely the decree of the United States Circuit Court entered last October, have been submitted to the Public Service Commission of Massachusetts for approval. They pledge the company to concentrate attention hereafter on the railroad property itself, to wind up as soon as practicable all its connections with subsidiaries not directly affecting the prosperity of the main line properties and not to acquire any new properties. The Housatonic Power Company will be sold with the exception of the undeveloped water rights of the Housatonic River, which will be necessary to provide power for the electrified division between New York and New Haven. The large real estate holdings along the New York, Westchester & Boston Railway held in the name of the Millbrook Company, will be sold as soon as proper prices can be obtained. The New York, Westchester & Boston Railway itself will continue to be under the operation of the New Haven company, the directors now intending to develop the territory in the belief that the line will become a paying investment. In the meantime, the company is to be consolidated with the Westchester Northern Railroad, a company which was formed in 1912 with the intention of building an extension to the New York, Westchester & Boston Railway from White Plains to Danbury, Conn. No construction work has yet been undertaken on this proposed extension.

THE CINCINNATI FRANCHISE

The Federated Improvement Association on Feb. 11 adopted a resolution to the effect that the organization will, under certain conditions, relinquish its opposition to the franchise granted the Cincinnati, Newport & Covington Street Railway by the city of Cincinnati. Three changes in the franchise are desired by this organization, namely, that the company agree to remove its tracks from any street in the city that may be wanted for the use of the interurban loop system, that it will never charge as fare between any two points in Cincinnati an amount greater than is

charged by the Cincinnati Traction Company, and that if at any time the Cincinnati Traction Company decides to operate its cars by other means than the overhead trolley, it will adopt the same means. The ordinance would have to go back to Council for these amendments. This company has already accepted the franchise offered it and filed a bond of $25,000 to insure that its terms will be observed. In addition, it has notified the Council in writing that it will change its route to accommodate the interurban loop plan, if that becomes necessary.

On Feb. 17 Polk Lafoon, secretary of the Cincinnati, Newport & Covington Street Railway, sent a communication to the association in which he pointed out the unreasonableness of re-submitting the ordinance to the City Council in order to avoid the expense of an election, because the organization is not in position to prevent a referendum vote on the amendments, after they are made, and the expense would be incurred any way. The number of signatures this organization secured to its petitions was 714, while Mr. Bigelow's organizations secured 10,276, and the number filed for a special election was 30,960. He assured the organization that the city would have the right to use the streets on which the company's franchise is granted for the rapid transit interurban loop, if it so desired and that competition would keep the rate of fare as low as that charged by the Cincinnati Traction Company. As to the change in mechanical equipment, he said no determination could be reached without knowing what such a change involved, but he did not anticipate any trouble in that direction.

The Council at Dayton, Ky., has adopted a resolution asking the officials of Covington to take steps to appeal the case in which the United States District Court recently decided that the South Covington & Cincinnati Street Railway owns a perpetual franchise in the streets of Covington.

NEW YORK INSURANCE LEGISLATION

The votes cast by four Republican Senators, all from Brooklyn, prevented the passage in the Senate on Feb. 17 of the Sage bill making an emergency appropriation of $425,000 for the Workmen's Compensation Commission and carrying a provision which authorized the direct settlement of compensation claims between employers or insurance carriers and injured workmen.

Superintendent of Insurance Frank Hasbrouck in his report to the Legislature, speaking of workmen's compensation, indorses the main features of the New York law, but says that it should be amended in certain particulars. He advocates that the forty-two groups be eliminated and the benefits extended to cover practically all employments. Another feature which should be corrected, he says, is the cumbersome method prescribed for settling claims. The four methods of insurance provided by the law are indorsed as affording healthy competition based upon service to the public. It is sugested that all employers be required by law to keep accurate payroll records for insurance purposes.

ANOTHER BOND ORDINANCE AT TOLEDO

On the evening of Feb. 13, an ordinance was introduced into the City Council of Toledo, Ohio, providing for a bond issue of $4,000,000, the proceeds to be used in acquiring the light, power, heat and artificial gas properties of the Toledo Railways & Light Company, under the provisions of the initiated municipal ownership ordinance, passed on Aug. 4, 1914. The ordinance was prepared by City Solicitor Thurstin and is similar to the one he introduced some time ago relating to the railroad properties of the company. The bonds are to run for twenty years and draw 5 per cent interest. Under the ordinance the rate for service is to be fixed by the Public Utilities Commission of Ohio or any other body that may be empowered to look after such duties. A maximum of 6 cents per kw.-hr. is provided for energy and 65 cents per thousand feet for artificial gas. The measure has been referred to the committee of the whole.

The same evening a resolution was introduced fixing the rate to be charged by the Toledo, Bowling Green & Southern Traction Company at 5 cents for carrying passengers from all parks and boulevards into the city. This is meant to cover certain lands the city has purchased for park purposes about 1 mile south of the southern city limits.

NEW JERSEY UTILITIES LEAGUE

The New Jersey Utilities League has been formed for the purpose of keeping its members informed of the introduction and progress of legislation affecting them. The formation of the league was due primarily to the introduction of a recent bill providing for certain taxation of franchises of public utility corporations in addition to the franchise and other taxes which they now pay. Many representatives of public utilities appeared at a hearing on this bill scheduled for last week, and as a result the hearing was postponed to Feb. 23.

There are more than 225 public utilities in the State, few of which have taken interest in legislative matters. The result was that the utilities and the public failed to realize that there were so many varied interests and companies. The league will unify these interests and enable them to work together to furnish correct information to the public and the legislators. A permanent bureau with headquarters probably in Trenton, where the Public Utilities Commission has offices, may be provided in the near future. The Public Service Corporation has become a member of the league. The officers of the league for the coming year are: President, John A. Riggins, New Jersey Northern Gas Company, Camden; secretary, W. H. Roth, 112 North Broad Street, Philadelphia, Pa. An executive committee has been appointed to look after the details.

INDIANA LEGISLATURE

The following new bills have been introduced in the House: a bill providing that interurban or street railways place tracks in the middle of the highways for a distance of 1 mile from the corporate limits of towns having a population of from 30,000 to 58,000; a bill providing that the franchises of all public service corporations be submitted to the state board of tax commissioners for assessment for taxation; a bill providing a fine of $100 to $500 for railroads carrying into or from point to point in the state intoxicating liquors, when such are to be sold in "dry" territory, and providing that packages must be labeled to proper consignee and as to nature of contents; a bill providing that traction companies operating more than 18 miles of track must maintain two toilet rooms in each car; a bill providing that public service companies giving service by measured rates shall not fix any minimum charge; an amendment providing that where a railroad intersects a person's land and takes property by condemnation, the owner shall have the right to construct driveways across the right-of-way; amendment to the public utility commission law curtailing the powers of the public service commission by giving municipalities direct control of utilities, the right to order joint use of utility systems, city authorities the right to regulate mergers, leases and sales of public utilities, cities the right to issue franchises for duplication of public utility service, and further provides that cities may decide if indeterminate permits are to be issued; a bill providing a maximum fare of 1½ cents a mile for adult passengers and ½ cent for persons five to twelve years of age on interurban railways, with the right to carry 150 lb. of baggage.

The following new bills have been introduced in the Senate: a bill providing that all street cars in cities of the third class shall be equipped with double trucks and air brakes; a workmen's compensation bill making it optional whether the state insurance feature or other proposal for liability insurance is chosen by the employer; a bill amending the public utility commission law by more fully defining the terms "unjust discrimination" in service; a bill providing that no public service company shall receive a franchise unless a petition showing that public convenience and necessity demand such a franchise has been filed with the public service commission; a bill amending the public utility commission law by eliminating the clause which requires all officers of public service corporations to be bona fide residents of Indiana, and extending the time when indeterminate permits may be taken by public utilities; a bill amending the public utility commission act to permit railroad companies to give employees passes where such employees are holding public office.

The Fleming bill making certain provisions for the ventilation of street and interurban railway cars has been killed in the Senate.

RAPID TRANSIT PLANS IN PHILADELPHIA

A. Merritt Taylor, director of city transit, Philadelphia, submitted to the Select and Common Councils of that city on Feb. 11 a special report on rapid transit development for Philadelphia in accordance with the resolution adopted by Councils on Feb. 4. This report contained a complete list of the subway, elevated and surface lines contemplated to be constructed under plans recommended by the department of city transit, with the cost of each. In his communication to Councils, Mr. Taylor requested that the finance committee report out the ordinances provided for the holding of the special election to authorize an increase in the city's indebtedness to the extent of at least $6,000,000 to provide money for beginning the transit development, and that the ordinance be passed by Councils without delay in order that the election might be held and the $6,000,000 be appropriated and the designating ordinances passed before the summer adjournment, so that actual construction of the high-speed lines could be commenced on July 1. He said that it would not be necessary to vote more than $6,000,000 of the transit loan until after the constitutional amendment had been voted on by the people in November.

The matter came up before Councils on Feb. 18. On that day a transit ordinance was introduced by John P. Connelly, chairman of the committee on finance, differing from the plans proposed by Mr. Taylor. The Philadelphia *Public Ledger* said in its issue of Feb. 19 that the Connelly bill in part was based upon a "joker" ordinance introduced several months ago by Peter E. Costello, an organization leader. The report from Mr. Taylor in regard to the transit plan was meanwhile referred by Councils to the joint committee on street railways and finance.

The Philadelphia *Public Ledger* said editorially on Feb. 19:

"The people of Philadelphia have yet to be heard from. They are in no mood to be trifled with, and this proposition is worse than trifling. They have a right to know under whose inspiration this scheme of the finance committee's was concocted, and what special interests it was intended to serve. This mutilated program would perpetuate conditions the escape from which is the whole purpose of the struggle for the last two years. Who inspired the change, and what are the ends sought to be accomplished by such a betrayal of the city's rights and needs?"

OHIO LEGISLATION

Electric and steam railway interests are opposing two bills introduced in the Ohio Legislature by Senator Pink, of Hamilton County, which make proof of an accident in which any one is injured or property damaged prima facie evidence that the car or train was improperly handled at the time. The railway men say that the bills rob the railways of any possible defense in case of accidents.

Somewhat akin to these bills is one introduced by Representative Terrell, of Cuyahoga County, which would establish the doctrine of comparative negligence in connection with cases in which street cars, automobiles, wagons and other vehicles are involved. This bill would make it mandatory that the degree of carelessness of all parties be established and that damages be awarded on that basis.

The Senate committee on public utilities heard arguments on Feb. 10 on the Winans bill, which gives the Public Utilities Commission the right to suspend railroad, railway and other public service rates for a certain time after their promulgation and places the burden of proof as to their reasonableness on the companies.

The Cleveland branch of the Amalgamated Association of Street & Electric Railway Employees arranged to send five members to Columbus on Feb. 18 to attend the hearing on the bill that defines the number of hours in each day that employees shall work and fixes other conditions. This bill, intended primarily to benefit the men in Cleveland, will apply to the entire state.

THE CINCINNATI APPRAISAL

The three members of the Ohio Public Utilities Commission went to Cincinnati on Feb. 12 to begin work on determining the value of the property of the Cincinnati Traction Company. They were accompanied by L. G. White, the electrical engineer of the department, and Lawrence K. Langdon, its attorney. Theodore Mayer and L. R. Smith, real estate experts, stated that they had already appraised the property at the request of the company and had filed their report in which the total value, irrespective of buildings, assemblage, continuity values, cost of acquiring and surveys, was $589,107. Mr. Mayer said the gross cost of the property including leases, commissions, percentage and surveys was $878,613. The "Somers system" was used in reaching the valuation placed on the property. Walter Draper, vice-president of the company, testified as to the cost of the property and its present condition.

L. F. Huntington, another local real estate man, testified that the cost of consents secured from property owners along the various routes, in his opinion, was about 54 cents per front foot. On this basis the total cost of consents to the company would have been $609,609, as the trackage in the city is estimated at 1,111,000 ft. A. L. Drum, building expert, and Bert Baldwin, electrical engineer, testified as to the value of superceded property, much of which had been abandoned before its useful life was spent, due largely to improvements made in equipment for transportation. The total given for this item was $2,277,995. The most costly property to be thus abandoned were horse cars, cable cars, steel rails that were unfitted for electric cars, inclined planes, cost of street repairing due to changing rails, etc. Mr. Baldwin, who was engineer for the Cincinnati Street Railway when horse and cable cars were used, said that the practice of the city was to require the company to do much more in the way of repaving than it should have done and that this often worked a hardship.

The members of the commission visited the properties of the company on the following day in company with W. Kesley Schoepf, president, and Walter Draper, vice-president. They will take the information secured from the men who testified, experts employed by the company, and the statements that have been filed by the company, from which a tentative valuation will be fixed. Then there will be hearings during which disputed points will be argued and further detail added, if necessary.

New California Road Opened.—The Monticeto Railroad has placed its new line in Los Angeles in operation. The road is 2.4 miles long.

New Line in Alabama.—The line of the Birmingham-Tuscaloosa Railway & Utilities Company in Tuscaloosa has been placed in operation.

Municipal Railway Bonds for Pekin.—Arrangements have been concluded between the city of Pekin, Ill., and Counselman & Company, New York, N. Y., under which that company will take the $48,000 of bonds voted by the citizens of Pekin last year for the reconstruction and rehabilitation of the local railway line in Pekin as a municipal undertaking.

Need for Signals on New York Elevated.—Clifton W. Wilder, electrical engineer for the Public Service Commission for the First District of New York, has reported to the commission that the accident on the Ninth Avenue elevated line of the Manhattan Railway on Feb. 6 demonstrates the necessity for some form of protective signals on the local and the express tracks on all elevated structures.

Fender Test in Toronto.—As a result of the conference on safety devices, held by representatives of the Toronto Railway with the Ontario Railway Board on Feb. 12 instructions have been issued by the board for the company to try out a new style of fender on its new cars. Engineer Royce of the board and an engineer of the railway have been instructed to report later on the experiment.

Hearing on School Fare Bill.—The bill providing for a half-fare for school children in New York State was opposed at a hearing before the railroads committee of the Senate and Assembly on Feb. 16 by the Interborough Rapid Transit Company on the ground that such action would constitute an infringement of the franchise by the Legislature. Representatives of the Brooklyn Rapid Transit Company and of the International Railway, Buffalo, opposed the bill on the ground that it constituted discriminatory legislation in that it favored school children as against minors who were forced to work for a living.

Kansas City Extensions.—The board of control of Kansas City, Mo., has made formal recommendations for improvements of service, which are now in the hands of John M.

Egan, president of the Metropolitan Street Railway. Among the items was the suggestion that the $250,000 of improvements provided for in the franchise ordinance should be met by the building of 3 miles of single track, Prospect, 48 to 71; 1 mile of single track, along the south side of Swope Park; 1¾ miles of single track, Twelfth, eastward from Jackson. If the city wants these extensions now, and President Egan decides for them, the city will probably ask Judge Hook to authorize the issuance of certificates.

Bills Before Texas Legislature.—The interurban railway interests of Texas are opposing the bill which Senator Darwin has introduced in the Senate providing for placing interurban lines under the jurisdiction of the State Railroad Commission. At a hearing on the measure before the Senate committee on internal improvements representatives of practically all of the existing interurban railways as well as those which are in course of promotion appeared and argued against the proposition. The committee made a majority adverse report on the bill, but a minority report was also signed which will bring the measure upon the floor of the Senate for consideration. Senator Robbins has introduced a bill providing for the creation of a public utility commission which shall have jurisdiction over municipal public utility plants.

Toronto Improvement Order.—One Feb. 9 representatives of the city of Toronto, Ont., and the Toronto Railway appeared before the Ontario Railway & Municipal Board in connection with the issuing of a formal order by the board based upon the judgment rendered last fall. Mr. Osler, counsel for the company, urged inability on the part of the company to secure money to comply with the recommendations of the board and asked for an extension of time after July 1 for building the Ossington Avenue line, completing the fifty new cars and finishing the 13 miles of new track required. The appeal regarding the 13 miles of line was favorably received by Chairman McIntyre. By the board's order, the railway will have until July 1 to finish this work. No extension was granted for the other work. If the company finds that it cannot finish the cars and the Ossington Avenue line within the time fixed the board must be convinced of the company's inability to finance them.

Opposition to Full Crew Laws.—The railroads of the States of Pennsylvania and New Jersey have begun in the newspapers an advertising campaign to obtain the repeal of full crew acts in those States. Daniel Willard, the president of the Baltimore & Ohio Railroad; Samuel Rea, president of the Pennsylvania Railroad; Theodore Voorhees, president of the Philadelphia & Reading, and R. L. O'Donnell, chairman of the executive committee of the Associated Railroads of Pennsylvania and New Jersey, have issued "an open, square, above-board, direct appeal to the intelligence and judgment of the people." The advertisement says that the official figures show that for the three-year period prior to the enactment of the law in Pennsylvania the total number of employees and passengers killed was 10,186. Since the law became operative that figure has been increased to 10,372 persons. The extra man on each train, representing $3,000,000 yearly, means an expenditure that could have been spent for 200 steel coaches, 80 locomotives, 67,000 tons of rails, 65 grade crossings or 800 miles of track.

Labor Bills in Ohio.—Representative Bohm, Cleveland, is the author of a bill that makes it compulsory on employers to see that their employees work only six days out of each week. Representative Smith's bill, requiring that conductors and motormen on street and electric railway cars be provided with dust-proof compartments, has been approved for passage by the committee that considered it. The penalty for violation is from $25 to $100. Representative Ott. Hamilton, has introduced a new section to the statute that limits the hours of work for railroad men. It applies especially to street and interurban men and provides in the first place that no car shall be placed in the hands of a motorman and a conductor unless they shall have had an experience of at least fifteen days under the guidance of men who have had as much as two years' experience on the line on which they are students. The men shall not be permitted to work more than nine out of any consecutive eleven hours in any twenty-four-hour day and they must have thirteen hours off-duty. Fines for violation of this provision range from $100 to $500 for each car each day. A bill by Representative King, of Hocking County, makes an agreement between employers and laborers a personal and not a property right, and denies the right to issue an injunction in cases where labor contracts are violated but where no irreparable loss or damage is about to occur. An application for an injunction must contain a detailed statement of the property rights in jeopardy. Another bill by the same author provides that all street and interurban cars shall be provided with air-brakes, the rigging of the brakeshoe to be attached to the journal beam of the truck and, also, that an adequate sanding device be furnished. It is required that 50 per cent of the cars in the State be thus equipped before Jan. 1, 1916, and the remainder within twelve months after that date. No penalty is attached.

PROGRAMS OF ASSOCIATION MEETINGS

Arkansas Association of Public Utility Operators

At a meeting of the executive committee of the Arkansas Association of Public Utility Operators, held at the office of the Little Rock Railway & Electric Company on Feb. 9, May 11, 12 and 13 were fixed as the dates for the 1915 meeting of the association. The meeting will be at Little Rock, with headquarters at the Marion Hotel.

Central Electric Railway Association

The following program has been announced for the annual meeting of the Central Electric Railway Association to be held on Feb. 25 and 26 at the Hotel Severn, Indianapolis:

Feb. 25

Address by Joseph E. Bell, Mayor of Indianapolis.

Address by C. Loomis Allen, president of the American Electric Railway Association.

Paper, "Is the Handling of Free Baggage a Traffic Error," by C. J. Laney, traffic manager of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.

Address by Samuel M. Ralston, Governor of Indiana.

Address by Charles C. Peirce, vice-president of the American Electric Railway Manufacturers' Association.

Address by Thomas Duncan, chairman of the Public Service Commission of Indiana.

Feb. 26

Address, "Safety," by Dana Webster, inspector for the accident and liability department of the Ætna Life Insurance Company, Indianapolis, Ind.

Annual report of the secretary and treasurer.

Annual address of E. F. Schneider, president of the Central Electric Railway Association.

Report of the nominating committee and the election of officers.

New York Electric Railway Association

The New York Electric Railway Association will hold its twentieth quarterly meeting at the Fort William Henry Hotel, Lake George, N. Y., Tuesday and Wednesday, March 2 and 3. The meeting will be opened with an informal dinner at 8 o'clock on the evening of Tuesday, March 2, after which there will be several addresses by distinguished guests. There will be one business session of the association. This will be held at 10 a. m. on the following day, Wednesday, March 3. At this meeting the following program of subjects will be presented for discussion:

"What the New York Electric Railway Association Could Do for Me." This subject will be considered in three-minute written discussions by all members.

"Collection and Registration of City and Interurban Fares." Introductory paper by James E. Hewes, general manager of the Albany Southern Railroad, Albany, N. Y., followed by three-minute written discussions by the members.

"What Constitutes Good and Sufficient Maintenance?" Introductory paper by James P. Barnes, general manager of the Buffalo, Lockport & Rochester Railway, followed by three-minute written discussions by the members.

Applications for hotel accommodations should be made to Albert Thieriot, manager of the Fort William Henry Hotel, Lake George, N. Y.

Financial and Corporate

SECURITIES FOR NEW CONSTRUCTION

More Than $8,000,000 of New Securities Authorized for Electric Railway Construction Purposes in New York in 1914

According to information obtained through the Division of Capitalization of the Public Service Commission for the Second District of New York, the amounts of new securities authorized for steam and electric railway new construction in New York State during 1914 and for other purposes were as follows:

Purpose	Steam	Electric	Total
New construction	$14,739,767	$5,163,650	$19,903,417
Payment of current liabilities incurred for new construction	90,065,000	2,965,750	93,030,750
Total	$104,804,767	$8,129,400	$112,934,167
Refunding and acquisition of constructed properties	72,525,000	2,447,000	74,972,000
Acquisition of capital stock		888,000	888,000
Grand total	$177,329,767	$11,464,400	$188,794,167

The foregoing figures were difficult of compilation on account of the feature of discount on securities and the fact that not infrequently an amount of bonds is authorized, the proceeds of which are slightly more or considerably less than sufficient to cover the purposes toward which the proceeds are to be applied. With such complications eliminated as far as possible, the figures may be taken to show the amount of new money authorized for construction during the year. Of the total of $188,794,167 authorized for all purposes, an amount of $112,934,167 or 59.8 per cent was for new construction. Of this sum $19,903,417 or 17.6 per cent was purely for subsequent new construction, while $93,030,750 or 82.4 per cent was for the payment of current liabilities already incurred for new construction.

Of the total of $112,934,167 for all new construction, $8,129,400 or 7.2 per cent was authorized to electric railways and $104,804,767 or 92.8 per cent to steam railroads. As just between the steam and electric railway totals, the steam railroad securities for new construction were 12.9 times as large in amount as the similar electric railway securities, but it must be remembered that the previously existing steam railroad capitalization was about 13.4 times as great as the electric railway capitalization. On the basis of the approximate $3,124,511,870 of steam railroad capitalization, the rate of increase for new construction was 3.3 per cent, while on the $225,053,330 of electric railway capitalization the corresponding increase was 3.6 per cent. It is interesting to note, too, that of the $104,804,767 for steam railroads only 14.0 per cent was authorized for new construction not yet undertaken, while in the face of the depression of 1914 the electric railways secured the authorization of 63.5 per cent of all the construction securities for absolutely new work.

All the computations to which reference has been made do not contain any figures for securities authorized by the Public Service Commission for the First District in New York City. If these and the city's expenditures of $2,000,000 a month for the new subway system could be included, the new construction of electric railways in New York State during 1914 would appear even better.

ELECTRIC BOND & SHARE CAPITAL INCREASE

The stockholders of the Electric Bond & Share Company, New York, at the annual meeting on Feb. 17 elected William Darbee and G. E. Claflin as directors to succeed Benjamin Strong, Jr., and R. Treat Paine. A special meeting of stockholders was subsequently held and an increase in the company's capital stock from $10,000,000 to $16,000,000 was approved. Of the additional stock $3,000,000 is common and $3,000,000 6 per cent preferred. It was announced that part of the newly authorized preferred stock will soon be offered to stockholders for subscription at par, and also that at the same time the General Electric Company is expected to take an equal amount of the new common stock for cash at its par value.

ANNUAL REPORTS

British Columbia Electric Railway, Ltd.

The statement of income, profit and loss of the British Columbia Electric Railway, Ltd., Vancouver, B. C., for the year ended June 30, 1914, follows:

Income	£560,150
Registration fees, etc.	424
Total	£560,574
Renewals, maintenance	£149,921
Office rent, salaries, etc.	7,367
Directors' fees and percentage	5,994
Trustees fees	881
Capital amortization	2,455
Total	£166,618
Balance	£393,956
Add:	
Balance from previous year	9,519
Transferal from reserve	10,000
Total	£413,475
Deduct:	
Interest on debentures	£132,991
Dividends already paid	216,000
Total	£348,991
Balance available for distribution	£64,484
Dividend declared on deferred ordinary stock	57,600
Balance carried forward for year	£6,884

The report states that the showing in the fiscal year was not of such a satisfactory character as that made in the past, and that, in order to maintain the usual dividend, it was necessary to supplement the profit by a transfer of £10,000 from the reserve. The earnings in the early part of the year were adversely affected by the prevailing conditions, but the depression of trade in Canada became accentuated as the year advanced and rigid economy was necessary to achieve the results shown. The large employers of labor in British Columbia were temporarily forced to postpone all new work, and there was a decrease in the population of Vancouver and the neighboring districts of approximately 20,000 inhabitants and consequently a decrease of more than 8,500,000 in the number of passengers carried during the year. It is believed, however, that the halt in the development of the province will in the end result in more stable conditions. The amount expended for capital account during the year was £530,103, but until more prosperous times further expenditures will be limited to absolute necessities. The company paid 5 per cent on its cumulative perpetual preference stock for the year, 6 per cent on its preferred ordinary stock and 8 per cent on its deferred ordinary stock. The directors state, however, that on account of the European war the revival in trade may be greatly retarded and there may be a drastic reduction in future dividends.

The J. G. Brill Company

The total combined output of the five plants owned and operated by The J. G. Brill Company for the year ended Dec. 31, 1914, amounted in sales value to $4,903,511. In only two other years, 1908 and 1909, have the sales fallen below the $5,000,000 mark. In 1907 and 1913 they ran more than $9,000,000, and from 1910 to 1912 inclusive the amount ranged from about $5,871,000 to $7,842,000.

The combined profit from operations for the year was $313,106, after charging against current earnings $158,475 expended for repairs and maintenance. From this profit there was set aside in the reserve for depreciation $154,222, making the total reserve now $1,601,312. The net profit for the year was therefore $158,884. Instead of the regular quarterly 1¾ per cent preferred dividend in November, the company paid 1 per cent, making the dividend total for the year $286,250. This with sundry adjustments brought the accumulated surplus of the company down from $1,535,417 to $1,368,370.

During the year the company strengthened the position of its liquid assets in face of the depressed conditions and reports as of Dec. 31, 1914, as its only current liability $220,348 of accounts in course of payment. In other years this item has ranged from $700,000 to $900,000. On the asset side, cash stands at $633,893 as compared with about $400,000 one and two years ago. Material, raw and in

process of manufacture, and bills and accounts receivable by their reduction in size indicate conversion into still more liquid assets. On Feb. 6, 1915, the combined orders of the plants in process of execution amounted to $1,147,100.

As regards the present outlook, the annual report of the company says:

"It is difficult at this time to form an estimate of the outlook for business in 1915. While general business conditions have improved and seem to be improving, it must be uncertain, in view of the extraordinary causes which brought about and which serve to continue the present depression, when a condition will be reached which will make it not only necessary, but possible as well, for the railways to purchase equipment, in what may be considered from past experience, normal amounts."

"BUY IT NOW" MOVEMENT

Various Steam Railroad Presidents Follow Out Principles of This Movement by Contributing Large Purchases

Advices received from C. C. Rosewater, chairman of the national "Buy It Now" campaign committee, indicate that tangible results most gratifying in character are being received by the committee. Steam railroads in particular have been sending news of large orders for equipment and supplies. D. Willard, president Baltimore & Ohio Railroad, states that his company recently placed an order for 2000 new freight cars, the first order for equipment in more than a year. This order was made in spite of the fact that the company has now more equipment than is needed under existing conditions. According to S. M. Felton, president Chicago Great Western Railroad, the company has already purchased $385,000 of material in anticipation of its requirements for the next six months and year, and is just about to enter into contracts for $200,000 of additional material covering the year's requirements. W. A. Gardner, president Chicago & Northwestern Railroad, states that the approval of the board of directors has been secured for the purchase of about $1,500,000 of material for which the company will solicit bids in the very near future. As an indication of what the New York Central Lines are doing, A. H. Smith, president, advises the committee that orders have been placed for 4500 tons of steel rails and that it is hoped to buy more shortly for use during 1915. The company recently bought eighteen engines and is now receiving 7000 freight cars purchased some time ago. W. H. Myers, vice-president Pennsylvania Railroad, states that the company has already asked for proposals for 150,000 tons of steel rails for 1915, and also for 17,000 tons of structural steel and 1200 tons of reinforcing steel. Communications from other railroad presidents contain no actual notices of material purchased but promises of co-operation.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—The Aurora, Elgin & Chicago Railroad has received authority from the Illinois Public Utilities Commission to issue $800,000 of collateral trust securities. It is reported that the collateral indenture has not yet been prepared, and no attempt has yet been made to sell the securities.

Binghamton (N. Y.) Railway.—At the annual meeting of the Binghamton Railway on Feb. 15, the following officers were elected: President, F. L. Fuller; vice-president, R. W. Day; vice-president and general manager, C. S. Banghart; secretary, W. H. Hecox; treasurer, E. M. White, and assistant treasurer, H. I. Jackson. The following members now constitute the board of directors: F. L. Fuller, R. W. Day, C. S. Banghart, A. J. Parsons, T. J. Keenan, W. H. Hecox, W. L. Connell, F. W. Ogden, C. R. Bedford, George E. Green and G. T. Rogers.

Chicago (Ill.) Elevated Railways.—The National City Bank, New York, is offering at the market price, to yield about 5.75 per cent, first mortgage 4½ per cent gold bonds of the South Side Elevated Railroad, dated July 1, 1904, and due on July 1, 1924. The amount of these bonds authorized and outstanding is $8,000,000. They are redeemable at 105 and interest on any interest date on three months' notice.

Federal Light & Traction Company, New York, N. Y.—John Dunhill has been elected a director of the Federal Light & Traction Company to succeed Samuel McRoberts.

Georgia Railway & Power Company, Atlanta, Ga.—Lewis Lillie, treasurer United Gas Improvement Company, has been elected a member of the board of directors of the Georgia Railway & Power Company.

Glendale & Montrose Railway, Los Angeles, Cal.—The Glendale & Montrose Railway Company has filed an application with the Railroad Commission of California requesting authority to increase its capital stock from $25,000 to $250,000. The company further asks for authority to issue to J. Frank Walters, its president and the owner of all the now outstanding stock, stock of the new issue in such amount as the commission shall find to represent the total cost of the railway's property at the time of the hearing of the application. The company proposes to use the balance of this stock for such additions and extensions and improvements as may be subsequently authorized by the commission. The company also filed a supplemental application asking that the authority previously granted to issue $200,000 of bonds be set aside, since it has found it impossible to sell these bonds now owing to the existing financial conditions.

Grand Rapids (Mich.) Railway.—Frank I. Silliman, Jr., Philadelphia, and Bert C. Cobb, New York, have been elected directors of the Grand Rapids Railway to succeed C. M. Clark and A. G. Hodenpyl. Louis J. De Lamarter was elected treasurer to succeed George L. Estabrook, resigned, the office of treasurer thus being added to that of secretary. S. E. Wolff was elected assistant secretary-treasurer.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—E. N. Sanderson, New York, has been elected president of the Gray's Harbor Railway & Light Company to succeed W. J. Patterson. F. G. Foster has been chosen a director of the company.

Humboldt Transit Company, Eureka, Cal.—The Railroad Commission of California has issued an order authorizing the Humboldt Transit Company to issue to the First National Bank of Eureka a promissory note for $20,000, to be secured by pledge of $40,000 of first mortgage 5 per cent bonds. This note, which will be executed by the Transit Company and William Butterworth as joint makers, is to take the place of a similar note of like amount previously issued by the company.

Interborough-Metropolitan Company, New York, N. Y.—The United States Circuit Court of Appeals on Feb. 10 affirmed the decision of Judge Hough of the Federal District Court, dismissing two suits brought by the Continental Securities Company, of which Clarence Venner is the head, to have the Interborough-Metropolitan Company declared an illegal monopoly and to set aside a mortgage covering $55,000,000 of bonds given to the Morton Trust Company as trustee. The court stated that even if the Interborough-Metropolitan Company were a monopoly, the Continental Securities Company had no cause of complaint about the condition of the Interborough Rapid Transit Company stock as a result of the merger. In the matter of the mortgage, the court stated that the questions involved had become academic by reason of the subsequent payment of the mortgage.

Interborough Rapid Transit Company, New York, N. Y.—The National City Bank, New York, is offering for sale at 97⅞ and interest, to yield 5.11 per cent, first and refunding mortgage 5 per cent gold bonds of the Interborough Rapid Transit Company, dated Jan. 1, 1913, and due on Jan. 1, 1966. Of the authorized amount of $300,000,000 of these bonds, $98,658,000 are outstanding. They are redeemable at 110 and interest on any interest date, as a whole or in blocks of not less than $500,000 or in any amount for the sinking fund. It is estimated that it will be necessary to issue about $160,000,000 of these bonds to provide for the commitments of the Interborough Rapid Transit Company under its subway contracts with the city.

Jacksonville (Fla.) Traction Company.—With reference to the recent passing of the usual Feb. 1 dividend on the $1,000,000 of common stock of the Jacksonville Traction Company, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 30, Hardy Croom, local manager of the company, states that the action is a result of the decrease in the company's earnings and the public improvements which the company has heretofore been required by law to put into effect,

and also the large amount of work that it now has on hand and intends to complete during 1915. Mr. Croom states that the majority of the inhabitants of Jacksonville are entirely in accord with the company in its efforts to give service in proportion to the patronage it is receiving, and that as business continues to grow better, conditions will go back to what they were before the present period of depression.

London (Eng.) Underground Railways.—The secretary of the London Underground Railways has officially announced that subject to confirmation of the respective dividend announcements for owned stock and also to the final audit of its accounts, the revenues of the company will be sufficient to pay full interest to Dec. 31, 1914, on its 6 per cent first cumulative income debenture stock and on its 6 per cent income bonds and leave about £35,000 to carry forward.

Long Island Railroad, New York, N. Y.—Dick Brothers & Company, New York, have issued another circular to the stockholders of the Long Island Railroad requesting proxies for the annual meeting on April 13. They express dissatisfaction with the present management and say: "We are willing to conduct a campaign against the present management at our own expense as we are the largest minority stockholders, owning and controlling 11,000 shares which we have held for many years, and all we ask is your moral support." A previous reference to the call for proxies was made in the ELECTRIC RAILWAY JOURNAL of Feb. 6.

Massachusetts Electric Companies, Boston, Mass.—It is reported that the Massachusetts Electric Companies will proceed at this time with the refunding of $3,100,000 of 5 per cent notes maturing on May 1, and for this purpose will issue $300,000,000 of 5 per cent three-year notes to be dated April 1. The new notes, like the maturing obligations, will be a collateral issue, secured by a deposit of a majority of the common stock of the Bay State Street Railway.

Minneapolis & Northern Railway, Minneapolis, Minn.—W. C. Leary, judge of the District Court for the Fourth Judicial District of Minnesota, on Feb. 1 issued an order that the creditors of the Minneapolis & Northern Railway, the Minnesota Loan & Trust Company as former receiver and F. H. Hunter as present receiver, should all appear before the court on Feb. 6 and show cause why an order should not be granted requiring the receiver to surrender all the railway property to the trustees, W. P. Veitch, L. H. Bolduc, H. F. Balch, M. H. Coolidge and C. T. Bratnober. At the same time an order was issued for creditors to show reason why the receiver should not deliver to the McKeen Motor Car Company the locomotive and two motor cars now used by him in the operation of the railway. Mr. Hunter's application for the dissolution of the receivership was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 23.

Municipal Tramways Trust, Adelaide, Australia.—According to the report of the Municipal Tramways Trust for the two years ended July 31, 1914, the revenue account for the electric traction system showed gross earnings for the year ended July 31, 1913, of £310,240 and for the year ended July 31, 1914, £328,809. For the first year the total operating expenses amounted to £207,318, giving an excess of income over expenses of £102,323. The operating ratio for the year was 66.82 per cent. The total operating expenses for the second year amounted to £202,503, the excess of income over expenses being £125,365. The operating ratio for this year amounted to 61.58 per cent. During the two years £150,899 was advanced by His Majesty's Treasury on construction account. A sum of £36,877 was added to the reserve for renewals, this sum being 2½ per cent on the capital cost of the renewable parts of the line already opened, plus interest. An amount of 1 per cent of the total receipts, or £6,713, was placed to the credit of the accident reserve. During the period 1993 third party accidents occurred, 697 affecting the general public and 1296 the passengers.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Eugene N. Foss was on Feb. 4 elected a director of the New York Municipal Railway Corporation to succeed A. N. Brady, deceased.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—At the recent annual meeting of the Oakland, Antioch & Eastern Railway, Henry T. Scott was elected a member of the board of directors to succeed H. J. Sutherland.

Pacific Power & Light Company, Astoria, Ore.—The Pacific Power & Light Company has sold to William A. Read & Company and White, Weld & Company, New York, $1,052,000 of first mortgage 5 per cent bonds, due 1930, and has sold to a syndicate headed by White, Weld & Company 5000 shares of 7 per cent cumulative preferred stock. The bonds have practically all been resold privately by the bankers. These sales bring the amount of bonds outstanding up to $7,001,000 and the amount of preferred stock up to $2,500,000. This company operates electric railways in Astoria and controls the Walla Walla Valley Railway.

Philadelphia (Pa.) Railways.—The gross earnings of the Philadelphia Railways for the year 1914 were $99,402 as compared to $100,157 for 1913, and the operating expenses $74,015 as compared to $82,694, giving net earnings $25,387 and $17,463, respectively. Bond interest remained the same at $20,000, other interest increased from $843 to $1,106 and taxes from $2,082 to $2,217. The result, therefore, was a surplus of $2,064 for 1914 as compared to a deficit of $5,462 for 1913. For 1914 a charge of $4,000 for depreciation was included in operating expenses.

Riverside, Rialto & Pacific Railroad, Riverside, Cal.—The Riverside, Rialto & Pacific Railroad has been authorized to issue 3000 shares of capital stock and $200,000 of 2½-year promissory notes bearing interest at 6½ per cent per annum in exchange for the property of the formerly sole-owned Crescent City Railway. The change in the legal form of the latter company was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 30. W. J. Bohon, general manager of the company, has issued a report denying that the Riverside, Rialto & Pacific Railroad will be taken over by the Pacific Electric Railway. According to Mr. Bohon, there may be a traffic agreement between the two companies, but the former company will continue to be operated separately.

San Joaquin Light & Power Corporation, Bakersfield, Cal.—The San Joaquin Light & Power Corporation recently filed an application with the Railroad Commission of California, requesting authority to issue a new series of first and refunding mortgage bonds, to be known as series "C" and to bear interest at 6 per cent per annum. The company now has outstanding $2,924,000 of series "B" 5 per cent bonds, and it is proposed to allow the holders to exchange these bonds for the new series "C" bonds upon payment of a premium of $100 per bond. The company also has $1,523,000 of series "B" bonds in its treasury, which it wishes to cancel and replace by bonds of the new series. In addition, the company requests authority to issue $136,000 of the series "C" bonds outright.

Springfield & Xenia Railway, Springfield, Ohio.—The gross and net earnings of the Springfield & Xenia Railway for 1914 were less than in 1913, on account of the fact that in 1913 the earnings were larger by virtue of the company with its connections at Xenia being the only line open between Springfield and Dayton during the flood. The net earnings for 1914, however, exceeded those of 1912 or any previous year by about 20 per cent. The company paid dividends of 5 per cent on its preferred stock and 3 per cent on its common stock.

United Traction Company, Pittsburgh, Pa.—The protective committee of preferred stockholders of the United Traction Company has received a letter from the Philadelphia Company, stating that the latter in connection with the Pittsburgh Railways will give due consideration to suggestions made by the committee's counsel regarding the non-payment of the semi-annual preferred dividends due in January. The Pittsburgh Railways, which is controlled by the Philadelphia Company, operates the United Traction Company by lease. The letter also said that for the purpose of considering the dividend question a special committee has been formed, consisting of James D. Callery, president United Traction Company and Pittsburgh Railways; Mason B. Starring, president United Railways Investment Company, and George S. Davison, a practical street railway man. The protective committee has received deposits of between 15,000 and 20,000 shares out of a total of 60,000 outstanding, in response to the call noted in the ELECTRIC RAILWAY JOURNAL of Feb. 13.

United Railways of St. Louis, St. Louis, Mo.—James Atkins, Breckenridge Jones and C. A. Tilles have been elected directors of the United Railways of St. Louis to succeed A. C. Einstein and Frederick J. Kinsella, and Robert McCulloch, deceased. Richard McCulloch has been elected president to succeed his father. The Mississippi Valley Trust Company and Altheimer & Rawlings Investment Company are offering for sale at 99 and interest, to yield 5.15 per cent, an unsold balance of $200,000 of first mortgage 5 per cent gold bonds of the St. Louis & Suburban Railway, a constituent company of the United Railways of St. Louis. The bonds are now a closed first mortgage on the main line of the former company.

Virginia Railway & Power Company, Richmond, Va.—The New York Stock Exchange has listed an additional $32,000 of first and refunding mortgage 5 per cent bonds of the Virginia Railway & Power Company, making the total amount listed $12,285,000.

Warren, Brookfield & Spencer Street Railway, Boston, Mass.—According to a direct communication from Thomas T. Robinson, receiver of the Warren, Brookfield & Spencer Street Railway, the Massachusetts Supreme Court on Feb. 10 issued a decree fixing $50,000 as the upset price for the property at the adjourned sale to be held on March 11. It is understood that the property will be purchased by a committee representing the bondholders, and that a new corporation will be organized in the interest of the bondholders to take over and operate the property. Previous items regarding the attempted foreclosure sale of this property for $150,000 appeared in the ELECTRIC RAILWAY JOURNAL of May 2, June 2, July 25, Aug. 15 and Sept. 12, 1914.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., quarterly, 1¼ per cent, common.

Columbus Railway & Light Company, Columbus, Ohio, 75 cents.

Middle West Utilities Company, Chicago, Ill., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Dec.,	'14	$152,658	*$143,817	$8,841	$2,989	$5,852
1 "	"	'13	168,957	*148,938	20,018	347	19,671
6 "	"	'14	1,097,376	*924,647	172,729	21,681	151,048
6 "	"	'13	1,137,190	*915,396	221,794	2,082	219,712

BATON ROUGE (LA.) ELECTRIC COMPANY

1m.,	Dec.,	'14	$17,128	*$9,524	$7,604	$2,053	$5,551
1 "	"	'13	16,386	*9,541	6,845	2,100	4,745
12 "	"	'14	178,825	*114,279	64,546	25,024	39,522
12 "	"	'13	163,128	*102,342	60,747	24,775	35,972

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m.,	Dec.,	'14	$8,071	*$8,091	$20	$1,145	†$1,165
1 "	"	'13	7,689	*7,836	147	1,079	†1,228
12 "	"	'14	121,757	*101,749	20,007	13,141	6,866
12 "	"	'13	124,403	*98,728	25,676	13,044	12,632

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1m.,	Dec.,	'14	$29,794	*$18,778	$11,017	$6,694	$4,323
1 "	"	'13	36,169	*17,633	18,537	6,367	12,170
12 "	"	'14	349,894	*211,119	138,774	76,779	61,195
12 "	"	'13	380,952	*209,953	170,999	72,913	98,086

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

1m.,	Dec.,	'14	$227,665	*$131,530	$96,135	$51,115	‡$49,069
1 "	"	'13	219,869	*151,702	68,167	46,110	‡20,420
3 "	"	'14	643,122	*373,798	269,324	152,687	‡121,540
3 "	"	'13	623,392	*401,288	222,104	138,703	‡79,800

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1m.,	Dec.,	'14	$21,486	*$13,823	$7,663	$5,605	$2,058
1 "	"	'13	24,833	*15,450	9,383	5,610	3,773
12 "	"	'14	276,633	*178,857	97,776	67,063	30,713
12 "	"	'13	296,853	*180,260	116,593	67,592	43,001

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m.,	Dec.,	'14	$29,461	*$16,527	$12,934	$7,699	$5,235
1 "	"	'13	29,523	*16,630	12,893	7,707	5,186
12 "	"	'14	303,515	*194,084	109,431	91,431	18,000
12 "	"	'13	296,565	*194,091	102,474	89,964	12,510

TAMPA (FLA.) ELECTRIC COMPANY

1m.,	Dec.,	'14	$85,501	*$42,327	$43,174	$4,423	$38,751
1 "	"	'13	83,107	*49,386	33,722	5,059	28,663
12 "	"	'14	981,000	*520,078	460,923	54,489	406,434
12 "	"	'13	844,941	*466,499	378,442	55,749	322,693

*Includes taxes. †Deficit. ‡Includes other income.

Traffic and Transportation

PORTLAND COMPANY ON "JITNEY" BUS

Statement Made Public at Portland, Ore., on Feb. 1 Published in Full

The full text of a statement in regard to the "jitney" bus made to its employees under date of Feb. 1 by the Portland Railway, Light & Power Company, Portland, Ore., follows:

"The advent of the 'jitney' bus in competition with our street car service has created a condition fraught with serious menace to the welfare of the company and its employees and, by reason of the important position occupied by the Portland Railway, Light & Power Company in the affairs of Portland, there are possibilities of far reaching consequences affecting disastrously the prosperity and progress of the city itself.

"For your information and also to assist you in meeting the arguments of others, this circular has been prepared for distribution among yourselves and others whom you believe are interested.

"First of all, it should be remembered that a distinction should be drawn between the auto bus and the 'jitney' car. The former, the name of which is self-explanatory, may have a legitimate field in urban or suburban transportation of both passengers and freight, but just what this field may be, we are not yet certain, but we do know that auto bus companies have failed in Philadelphia, Indianapolis, Pittsburgh, St. Louis, New Haven, Dallas, Los Angeles, and nearly all other American cities where they have been tried. So far, we know of but one auto bus company which has made a reasonable success in urban transportation, and that is the company charging a 10-cent fare operating on Fifth Avenue, New York, a street without a car line and of very dense and heavy traffic. The 'jitney' car service, however, by which is meant the transportation of passengers in small automobiles in direct competition with street car systems and with the auto bus, can never be organized into a systematic service even approximating reliability. Let us see why this is so.

"In the first place it probably needs no argument to demonstrate that new or nearly new automobiles cannot be profitably employed in this service. Indeed, those who are familiar with automobile costs and operating expenses know that even with the second-hand car, despite its small investment charge, the margin remaining above operating costs, exclusive of the driver's compensation, is generally so small except in the districts of dense population and short hauls, that it would constitute not a very attractive wage for the driver. The Seattle *Post-Intelligencer* of Jan. 24, 1915, published the report of the chief engineer of the Public Service Commission of Washington, certainly a disinterested body, showing that the average earnings of the 'jitney' driver is only 23 cents an hour.

"Unfortunately, alike for the 'jitney' operator, as well as for yourselves, for the company and indeed all concerned, excepting perhaps the vendors of second-hand automobiles and supplies, the 'jitney' in the beginning shows an apparent though fictitious profit, and it usually takes several months before the misled 'jitney' operator realizes that his fancied profits are, after all, only imaginary. Hence, much time may elapse before all the prospective 'jitney' operators realize, by sad experience, this phase of 'jitney' service, but in the meantime very considerable harm and damage may be done to the city, to the citizens, including yourselves, and to the street railway.

"Since the 'jitney' service must then be confined to very low priced or second-hand cars, it seems very doubtful that any responsible business man or group of business men, would put a considerable investment in apparatus bordering upon junk for so important a venture as a system of transportation, and even if a speculative individual or group were willing to provide the necessary equipment, they would be faced at once by the problems of how to collect and conserve the revenues. Manifestly, they would find it impossible to gather together a number of trained, reliable operatives such as are found in organized transportation service. Certainly, it would take a time approximating that of the street railways whose men have been years in ac-

quiring their training and experience, which includes physical examination for which a high standard has been set, also extended training and instruction before the applicant is allowed to operate a car and thereafter, constant instruction by men long experienced and with considerable ability in transportation service.

"Assuming, however, that a number of 'jitney' operators had been secured, a little reflection will make clear that the system in vogue on street cars and auto busses of paying the operators a fixed hourly or daily wage and having them turn in their revenue checked by registers or other mechanical devices is out of the question in 'jitney' service. But one other method apparently is possible, and that is to allow the operators to retain the earnings of their 'jitney' cars but pay to the would-be organizer a flat sum daily, weekly, or at other periods as agreed, in consideration of the organizer's work of planning routes, schedules and perhaps supplying collective insurance.

"Having got that far and having assigned the 'jitney' operators to routes, let us consider the invidiual whose run is at hours not convenient to him or whose line is in thin territory with relatively much smaller revenue possible, or the combination of both, and figure for yourself how long he will stay there. As shown by the experience in all the cities where the service is operated, the 'jitneys' will inevitably gravitate to the thickly settled, short haul districts with the natural consequence of dissatisfaction on the part of the 'jitney' drivers already in that territory. And when to this is added a number of independent operators, responsible to no one but themselves as to choice of routes and time of operation, the inevitable result is confusion and irresponsibility and all efforts at organization must fail and each operator then becomes a free lance. Such has been the experience of all the cities at present afflicted with the 'jitney.'

"In Los Angeles, for example, nearly all the 'jitney' drivers aimed to be in the downtown district at the same time to pick up and carry away homeward-bound loads. This resulted in enormous traffic congestion against which have been recorded strong protests by the fire department, the police department, the Chamber of Commerce, the Merchants & Manufacturers Association, the Mayor, the improvement clubs, the realty board, and finally the mothers of the city have taken up the cudgels against the 'jitney.'

"The Los Angeles *Times*, under date of Dec. 29, 1914, makes the statement that accidents have increased 60 per cent since the advent of the 'jitney' in that city. The Seattle *Post-Intelligencer*, under date of Jan. 17, 1915, reported nine automobile accidents in that city, of which seven involved 'jitneys.'

"In some of the California cities the serious menace of the 'jitneys' from the standpoint of morality has aroused the women of those cities to take urgent action to safeguard girls and young children against the evils which have followed in their wake. Numerous items in the press cite instances of insult and mistreatment to girls in crowded 'jitneys.' In Los Angeles, fake 'jitneys' are held responsible for the disappearance of several young women, while in Berkeley two co-eds narrowly escaped such experience. Indeed, it is asserted that questionable resorts are sending out 'jitneys' operated by women as well as by men.

"Some of the above instances are specifically mentioned in the Los Angeles *Examiner*, Jan. 9, 1915; San Francisco *Chronicle*, Jan. 21, 1915; Los Angeles *Times*, Jan. 24, 1915.

"In the southern cities where the street car companies found it necessary to curtail the car service because of the 'jitney,' the adverse effect upon the patrons and the business interests of the outlying districts brought home to these people at once the serious result of the continuance of irresponsible 'jitney' service.

"The 'jitney' has but two things to offer as advantages. The first is novelty, which will soon wear off. The second is somewhat higher speed. As against these are so many disadvantages and evils, such as utter irresponsibility, increase of accidents, of serious menace to morality, lesser convenience, lesser service and lack of transfers as compared with the street car systems, depreciation of business and property interests, that there can be no valid objection to any reasonable and legitimate movement to subject the 'jitney' to proper municipal regulation.

"A number of California cities have enacted ordinances regulating the 'jitney,' among them Venice, Long Beach, Pasadena, Los Angeles, Oakland, Fresno.

"In Los Angeles, where a flat 5-cent fare, without commutation rates is charged, the railway cited statistics to the effect that

" 'For every nickel collected in fares more than 3 cents is expended directly for labor in this city. On the remaining 2 cents at least 1 cent goes for taxes, license, street improvements and material, four-fifths of the whole is returned whence it came, to benefit the people of Los Angeles. The remaining fifth takes care of the interest charges on the bonded indebtedness, and as many of the bonds are owned in California, a share of this last fifth also remains here.

" 'In contrast to this showing is the 5-cent fare paid to the 'jitney' bus driver. Four-fifths of this sum must go for gasoline, oil, rubber tires and to pay for the machines, for few of them are owned outright by the men operating them. It is a direct reversal of conditions. In the latter case 4 cents in 5 goes out of the city; in so far as the street cars are concerned, that same proportion in the nickel stays here.'

"The above quotation is from the Mayor's message to the City Council and will hold substantially true in nearly every American city of similar class."

EFFECTIVE "JITNEY" ORDINANCE

Full Text of "Jitney" Regulatory Ordinance Passed and Approved in Boise

An ordinance passed by the City Council of Boise, Idaho, regulating the "jitney" had up to Feb. 12 acted effectively as a deterrent to the starting of "jitney" service in that city previously planned. This ordinance as passed follows in full:

"An ordinance making it unlawful for any person, firm, association of persons, or corporation, either as principal, officer, agent or employee, to use or occupy any street, alley, or other public place in Boise City, Idaho, with any automobile or other vehicle whatever for the carriage of persons for hire, and operating for the purpose of affording a means of local street transportation similar to that ordinarily afforded by street railways by indiscriminately accepting and discharging such persons as may offer themselves for transportation along the way or course on which it is used or operated or may be running, without first obtaining a license from Boise City; providing for the giving of indemnity as security to the public; providing for the filing of the designation of the route intended to be traveled by such vehicles; providing regulations for the conducting of such business; prescribing a penalty for the violation thereof; and repealing all ordinances and parts of ordinances in conflict therewith. Be it ordained by the Mayor and Council of Boise City, Idaho:

"SEC. 1. It shall be unlawful for any person, firm, association of persons or corporation either as principal, agent or employee, to use or occupy any street, alley or other public place within the corporate limits of Boise City, Idaho, with any automobile or vehicle whatever for the carriage of persons for hire, and operating for the purpose of affording a means of local street transportation similar to that ordinarily afforded by street railways, by indiscriminately accepting and discharging such persons as may offer themselves for transportation along the way or course on which it is used or operated or may be running, without first obtaining a license from Boise City, Idaho.

"SEC. 2. Any person, firm, association of persons or corporation shall, before receiving a license for carrying on the business defined by this ordinance, file with the city clerk a map of its designated route, showing the streets, alleys and public places upon which it is intended to operate, together with the operating schedule or headway to be maintained, the number of cars or vehicles to be operated, with the tariff of fares to be charged for such service. Before granting a license the Council shall approve or modify, and approve as modified, any such route, operating schedule or headway, and tariff of fares; and the acceptance of such license shall be deemed an agreement

by any such person, firm, association of persons or corporation to operate its cars over the route upon the schedule or headway, and for the fares; and for failure so to do the license which may be in force shall be subject to revocation.

"Sec. 3. Every person, firm, association of persons or corporation shall pay to the city clerk of said city the sum of $75 per annum in advance as a license for any automobile or vehicle carrying not to exceed five passengers; from five to ten passengers, the sum of $100, and from ten to twenty passengers, the sum of $150; before it shall be lawful for any such automobile or vehicle to engage in the business herein defined.

"Sec. 4. Every person, firm, association of persons or corporation shall provide and file with the city clerk an indemnity bond in the sum of ten thousand ($10,000) dollars for the operation of not to exceed two automobiles or vehicles, and when it is desired to operate more than two such vehicles an indemnity bond shall be filed in the sum of twenty thousand ($20,000) dollars; and it shall be the duty of the clerk to present such security to the Council at its first meeting, and such security shall be acceptable to and approved by the Council before it shall be lawful to operate any such automobile or vehicle in conducting the business herein defined; and it shall be and is hereby made the duty of any person, firm, association of persons or corporation engaging in the business herein defined to keep and maintain such indemnity bond at the amounts herein specified, during the whole time of their operation; and such bond or indemnity shall be conditioned to the effect that in the event of any person or property being injured or damaged by negligence or carelessness in the operation of any automobile or vehicle owned or operated by the person, firm, association of persons or corporation filing such indemnity, the person so injured in his person or property shall have a right of action thereon, and such bond shall not be void upon first recovery, but may be sued upon and recovered upon from time to time until the full penalty thereof is exhausted.

"Sec. 5. It shall be unlawful for any person, firm, association of persons, or corporation, to allow, permit or cause any automobile or other vehicle used in the business herein defined to be operated by any person other than one over twenty-one years of age, skilled in the art of driving automobiles, and having a sufficient knowledge of the English language to carry on an intelligent conversation. The names of such operators shall be registered with the chief of police, and he shall report to the Council the names of any operators who are not qualified under this section, or the operation of any such automobile or vehicle by any person whose name is not so registered, and any violations by any such operators of the traffic ordinance of Boise City; and the Council may, if they find any such operator unqualified, or that any such violation of the traffic ordinances has been committed by any such operator, take the action prescribed by the following section.

"Sec. 6. All applications for licenses required in the business defined by this ordinance shall be made to the Council of said city, and no license shall be granted unless in the opinion of the Council the applicants shall meet all the requirements of this ordinance; and it shall be deemed and considered a part of such license that the Council reserves the right to suspend, cancel or revoke the same for any infraction of the traffic ordinances of said city, or when in the judgment of the Council it shall be to the best interest of the public that such license be suspended, cancelled or revoked.

"Sec. 7. Any person violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor, and upon conviction thereof in the police court of Boise City, Idaho, shall be fined in any sum not less than $25 nor more than $100. And every day's violation of this ordinance by any one automobile or vehicle shall constitute a separate and distinct offense.

"Sec. 8. That all ordinances and party ordinances of the city of Boise in conflict herewith be and the same are hereby repealed.

"Sec. 9. This ordinance shall be in force and take effect within a period of ten days after its passage, approval and publication."

PRESIDENT LILIENTHAL TALKS

Describes His Experiences After Assuming Presidency of the United Railroads, San Francisco

An interview with Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., appeared in the New York *Evening Post* of Feb. 10. The interview was particularly interesting in the light that it shed on the conditions imposed by Mr. Lilienthal when he assumed office with the company. The work that Mr. Lilienthal has done for the company and men under him in connection with instituting pensions for them, arranging a plan under which they may own their own homes, releasing them from the machinations of the money lenders and otherwise bettering their conditions has been reviewed from time to time by the Electric Railway Journal. In connection with other matters Mr. Lilienthal said in part:

"One day about a year and a half ago I received a brief telegram from New York asking me if I would accept the presidency of the United Railroads. If you had received a message of somewhat the same nature from the Czar of Russia, and I presume you do not know him, you would not have been more surprised than I was. After realizing what it meant, I said to myself: 'I'll have to go off into a corner alone and think this thing over.'

"There wasn't any political or corporation position that I wanted then or that I want now. My income from my practice as a lawyer was sufficient for myself and my family, and I was satisfied with the quiet life I was leading. The offer, however, tempted me, for I saw the possibilities of running a public-service corporation that would stand as a pattern.

"After talking with my friends and naming certain conditions, I accepted the position. The conditions were that I was to have, without any question, a free hand in the management and operation of the company. Interests owning a majority of the stock actually turned their proxies over to me, and I selected and elected my own board of directors. The list is made up entirely of San Francisco men, who are generally recognized in their own city for character, intelligence, and experience.

"After electing my own board I immediately issued a public statement to the effect that I was going to try to give good service, that I was going to take care of my employees, and that it was up to the public to let me know when anything was wrong. I merely asked the public over my own name to give me a chance to correct anything that was wrong; to come to me and let me know, personally. In that same statement I announced that the United Railroads, as long as I remained president, would keep out of politics. It was stated further that if the company ever undertook to influence public opinion it would do so openly and over the name of the company.

"I made it my business to go to dances and sociables given by our men, and I come in contact with them daily while they are in service, and while they are using our recreation and reading-rooms, and to get in touch with them in another way we publish a magazine for employees only. What we are driving at there is to establish a kind of family relation. In articles I write for that magazine regularly I talk things over with the men, and ask them to come in to see me when they have anything of interest or importance to discuss. And when they come I do not turn them over to my secretary or some other official; I see them myself.

"I am not trying to become a railroad magnate, nor am I trying to make money. I am getting old, and all I am trying to do to polish off the end of my life is to set an example with labor that will be followed by some other public service corporations.

"While we are competitors with the municipal railway lines in San Francisco we do not have any trouble with the city. We told the city officials publicly long ago that we would build lines wherever they were needed, and we do. We do not build lines that will not pay; we said that while such lines are wanted, the work should be done by the city and charged to an account fund, much as would be done in maintaining or building a hospital in the interest of the general public."

THE BOSTON SAFETY RECORD

Boston Elevated Railway Advertises Its Award of the Brady Medal

The Boston (Mass.) Elevated Railway, to which was awarded the Anthony N. Brady gold medal by the American Museum of Safety, had a full-page advertisement in the Boston papers of Feb. 12 calling attention to its being awarded the medal and to the record made by the company in safeguarding the lives of its passengers and employees during the year ended June 30, 1914, in which not a single passenger was killed as a result of the negligence of the company or its employees and not a single fatal accident occurred on the elevated or subway trains. The entire passenger traffic during this period averaged more than 1,500,000 passengers a day. The company announced that the advertisement was prepared and paid for by it in the belief that it was the most effectual method of bringing to the attention of the public the facts related, in the expectation that it would lead to still better results for all. The company said that the remarkable record which had been established was made possible through the combined efforts of the company, the public, the safety campaign committee of the Chamber of Commerce, and, particularly, the splendid response made by the employees in their efforts toward the saving of life and preventing injury. In making its acknowledgment to the public the company said:

"For the distinction which comes to our community and the Boston Elevated Railway, the company desires to make pupblic and grateful acknowledgment to its patrons, school and all other public authorities, the Boston Chamber of Commerce, business concerns, parents, newspapers, and especially to its employees for their co-operation in making a reality the words 'Safety First.'"

M. C. Brush, second vice-president of the company, had the following notice posted in all the carhouses and power houses of the company:

"I wish to thank all the employees of the bureau of transportation for their sincere co-operation and efforts in helping to make such a record in the prevention of accidents as to have warranted the selection of this company for first place by the Brady Memorial Jury. It should be a thought of great satisfaction to each and every one who through his or her thoughtfulness has helped to prevent needless injury and suffering, and I sincerely trust that you will earnestly try to continue your efforts and so improve that our combined record may be still better the coming year."

CHICAGO LOOP TRACK CAPACITY REACHED

While a witness before the Illinois Public Utilities Commission, L. A. Busby, president of the Chicago Surface Lines, stated that the lack of track capacity rather than the lack of cars accounted for the congestion during the rush hours in the Chicago down-town loop. He stated that on occasions 20 per cent of the cars on a line entering the loop were idle during the rush hours, because they were unable to move more than a car length at a time owing to the interference of cross-traffic at street intersections. Summing up, Mr. Busby stated that it was impracticable to put any more cars into the loop on the existing tracks.

Mr. Busby also furnished other interesting information. He stated that the Chicago Surface Lines averaged 3,060,000 passengers a day, including cash, transfers and free rides. The ratio of cash fares to total rides was approximately 50 per cent. Fully 80 per cent of the local passenger traffic was on the surface lines. The number of cars operated varied from 2700 to 2740 each day. The surface lines operated 902 miles of track and employed approximately 7150 motormen and conductors, and about 4000 other employees. Mr. Busby offered as the most important suggestion for remedying the existing congested conditions during the rush-hour period an initial subway system built approximately along the lines suggested by Bion J. Arnold more than a year ago. Other suggestions included universal transfers, the elimination of team traffic from the street railway tracks, the turning back of cars outside of the congested district, the electrification and through routing of steam suburban lines and the adoption of trail-car operation. It would be feasible to use trailers now and they would help materially to reduce congestion.

Complaints in Legal Form.—The International Railway, Buffalo, N. Y., announces it will no longer consider complaints regarding service, etc., unless they are made in legal manner and sworn to before a notary public.

How to Avoid Catching Cold.—The Brooklyn (N. Y.) Rapid Transit Company has issued employees' bulletin No. 12, dated Jan. 15, in which advice in regard to how to avoid catching colds is given by Edward T. Gibson, physician in charge of the medical inspection bureau of the company.

Service in Dayton.—On Jan. 20 the public utilities commission of the Greater Dayton Association decided to forward suggestions submitted to it for the improvement of the street railway service to the Presidents' & Managers' Association, composed of the heads of the various local electric railways.

One-Man Operation on New York Road.—The Putnam & Westchester Traction Company, Peekskill, N. Y., has adapted the one-man principle to its line from Peekskill to Mohegan Lake. The cars are of single-truck design and no changes were made in them other than the erection of a stanchion to hold a fare box.

Fare Change of New York State Railways.—The Fonda, Johnstown & Gloversville Railroad has been eliminated from the list of carriers over whose lines interchangeable coupon ticket books, sold by the New York State Railways, will be accepted for transportation. The change is effective on March 1, 1915, and applies only to books sold on and after that date.

"Car Full" Signs for Toronto.—The Ontario Railway & Municipal Board has approved the plan of the Toronto Railway for limiting the capacity of its cars. When the company's by-law becomes effective, probably in the spring, the accommodation of each car will be limited to its seating capacity and a number standing equal to 50 per cent of the seating capacity. When that point is reached the conductor will post a sign declaring the car full.

I. C. C. Indianapolis-Louisville Case.—The Interstate Commerce Commission has fixed Feb. 23 as the date for hearing the case of the Board of Trade of Louisville, Ky., against the Indianapolis, Columbus & Southern Traction Company and other lines, concerning the division of earnings on through business among the electric railways operating between Louisville and Indianapolis. The hearing will take place in Indianapolis before Examiner Fleming.

Matters Before Maine Commission.—Several petitions regarding electric railway service have been filed with the newly formed Maine Public Utilities Commission. The citizens of Saco ask for an extension of the 5-cent fare on the Saco Division of the Portland Railroad, from Saco to the Scarboro line. Employees of the car shops of the Maine Central Railroad at Waterville have petitioned the commission for better electric railway service between Waterville and Fairfield.

New Pittsburgh Transfers.—A new transfer system will soon be placed in operation by the Pittsburgh Railways in exchange for rights and privileges to be granted by Council, such as use of the new Point bridge, turnouts and switches in downtown streets, it is unofficially announced. The report followed numerous conferences between J. D. Callery, president, and P. N. Jones, general manager of the company, with Mayor Joseph G. Armstrong, members of Council and the city's legal department.

Wireless an Aid to Traffic.—On February 13 the Cleveland & Buffalo Transit Company completed arrangements with the Cleveland Railway through which the railway will be notified by wireless each morning of the number of passengers on the steamer bound for Cleveland. The steamer company will use the new East Ninth Street piers during the coming summer and cars will always be parked on the loop at the foot of that street to take care of the traffic when the boat lands.

Freight Ordinance in Pittsburgh.—The Pittsburgh Chamber of Commerce has adopted a resolution directing its municipal affairs committee to prepare an ordinance to legalize the hauling of light freight by street railways. Dr. J. P. Shaw, who made the motion, asserted that this is now being done illegally. The Legislature in 1907 passed an act permitting street railways to haul light freight, but

provided that an acceptance ordinance must be adopted by the Councils. Dr. Shaw claimed that this has never been done.

Plan to Suppress "Jay Walkers" in New York.—The Mayor's central committee on street traffic and safety at its session at Police Headquarters in New York on Feb. 15 indorsed the plan to forbid persons on foot to cross congested streets except at corners and at street crossings in the middle of long blocks. The crossing in the middle of long blocks will be designated by painted lines, according to this plan. Whether the regulation must be enacted by the Aldermen or by the Legislature was left for the Police Commissioner to decide.

Discussion on Massachusetts Workmen's Compensation Act.—At the regular monthly meeting of the Massachusetts Street Railway Association in Boston on Feb. 10, H. R. Bygrave, of the Frankford General Insurance Company, discussed the effect of the Massachusetts Workman's Compensation Act since its passage about three years ago. The cost of this compensation has risen from $1,500,000 for 1913 to an estimated total of $3,500,000 for 1915. The Industrial Accident Board has found in the employee's favor in 80 per cent of the cases brought before it.

B. R. T. Objects to a New Line Order.—The Brooklyn (N. Y.) Rapid Transit Company has served notice on the Public Service Commission for the First District of New York that it will not obey the commission's order of Feb. 9 calling for the operation of a new surface car route from Meeker Avenue across Newtown Creek and over the Williamsburg Bridge to Manhattan, with suitable connections with the Lorimer Street line to provide for transfers. The company contends that the commission has no power to make the order; that it has no authority to order changes in the Lorimer Street line which will necessitate abandoning cars; that there is no demand by the public for the change, and that the extension is unreasonable because of the expense it would involve.

Chicago Questions Authority of Utilities Body.—A demand by Berwyn, a suburb of Chicago, for a 5-cent fare to Chicago with all transfer privileges, in a hearing before the Illinois Public Utilities Commission, raised for the first time the question of the authority of the commission to regulate contract ordinances with transportation companies. The commission's authority was questioned by an attorney representing the Chicago City Railway in enumerating his objections to granting the demands of Berwyn. Assistant corporation counsel for the city of Chicago objected that as the constitution of the State gave the city exclusive control over the operation of its street railways, neither the Legislature nor any agency created by the Legislature could impair or contravene such rights.

Campaigning for Increased Passenger Rates.—Application has been made in Illinois by the Middle West steam railroads for an increase in the passenger rates from 2 cents to 2½ cents a mile. Presidents and other officials of eleven railroads operating in this State have called upon Governor Dunne and requested his co-operation. The Governor favors a full and fair hearing before the Legislature, but has warned that in view of the fact that the 2-cent rate has been in force eight years without a protest, the representatives of the steam roads will have to satisfy the Legislature that the present 2-cent rate is unfair and unremunerative. In the meantime the railroad officials are requesting the public through commercial organizations or at public hearings to express themselves favorably on the question of increased passenger rates.

Kentucky "Jim Crow" Law Upheld.—Violation of the "Jim Crow" law by the Louisville & Interurban Railroad was made basis of a suit for damages just heard in the Circuit Court at Louisville, Ky., and resulted in peremptory instructions that the jury find for the plaintiff. Judge W. H. Field, before whom the case was brought, held that the "Jim Crow" law is applicable to interurban railroads with a mileage greater than 29 miles, saying that the Interstate Commerce Commission had upheld the validity of the State act requiring separate compartments for the white and the colored passengers, and that under the law the plaintiff was entitled to damages. He so instructed the jury, pointing out that the award must not be in excess of $2,500 and the jury returned a verdict of $30 in favor of the plaintiff.

Personal Mention

Mr. S. E. Wolff has been elected assistant secretary-treasurer of the Grand Rapids (Mich.) Railway.

Mr. E. N. Sanderson, New York, has been elected president of the Gray's Harbor Railway & Light Company, Aberdeen, Wash., to succeed Mr. W. J. Patterson.

Mr. Howard Walker has been appointed district superintendent of District "C" of the Ohio Service Company, with office at Cambridge, Ohio, to succeed Mr. W. S. Hayes.

Mr. L. J. DeLamarter, secretary of the Grand Rapids (Mich.) Railway, has been elected to the additional office of treasurer of the company to succeed Mr. G. L. Estabrook, resigned.

Mr. Daniel W. Reese, formerly in the mechanical department of the Philadelphia & Reading Railroad, has been appointed as master mechanic of the Reading Transit & Light Company, Reading, Pa., succeeding Mr. John L. Gould, recently resigned.

Mr. G. L. Estabrook has resigned as treasurer and assistant secretary of the Grand Rapids (Mich.) Railway. He is succeeded as treasurer by Mr. L. J. DeLamarter, secretary of the company, and as assistant secretary by Mr. S. E. Wolff.

Mr. Edward J. Carroll, who is in charge of the electric railway operated in Shanghai, China, is on a visit to the United States. He was in Berlin when war was declared. He expects to leave from San Francisco shortly for Nagasaki, Japan.

Mr. W. L. Palmer, who resigned recently as claim agent for the Illinois Northern Utilities Company at Dixon, Ill., will not become connected with the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., as announced previously.

Mr. W. H. Hazlitt has resigned as purchasing agent of the British Columbia Electric Railway, Vancouver, B. C., after a service of fifteen years, and Mr. C. A. Lee, formerly connected with the engineering staff of the company, has been appointed to fill the vacancy.

Mr. A. E. Beck, who has been connected with the legal department of the British Columbia Electric Railway, Vancouver, B. C., for seven years as claim agent, has resigned. The duties of the office will hereafter be carried out under the direction of Mr. V. Laursen, the company's permanent counsel.

Mr. Allen Purvis, manager of the interurban lines of the British Columbia Electric Railway, Vancouver, B. C., has resigned. The interurban lines will hereafter be operated under the direction of Mr. W. G. Murrin, general superintendent. The work of the various divisions will be carried out by division superintendents as heretofore.

Mr. Robert M. Feustel, chief engineer of the State Public Utilities Commission of Illinois, has tendered his resignation to the commission to take effect on March 1. Mr. Feustel is a member of the firm of Sloan, Huddle, Feustel & Freeman, consulting engineers of Madison, Wis., and was formerly assisting chief engineer of the Railroad Commission of Wisconsin. His withdrawal at this time is for the purpose of resuming his consulting engineering practice with the above firm, which practice he temporarily relinquished in order to organize the engineering department for the Illinois Commission. During the last year the organization of the engineering staff has been effected, rules establishing standards of service for various types of utility properties have been prepared for the commission's adoption, and the general method of collecting data for rate making cases has been outlined, which latter information the commission will issue in pamphlet form in the near future. It is understood that the commission has not as yet determined upon the successor to Mr. Feustel.

Mr. Walter N. Cargill, for the last four years a member of the engineering staff of the Stone & Webster Engineering Corporation, Boston, Mass., will sever his connection with the Stone & Webster organization on April 1, 1915, to become superintendent of power and lines of the Rhode Island Company, with headquarters at Providence, R. I. Mr. Cargill is a native of Liberty, Maine, and was graduated in

1900 from the University of Maine in the electrical engineering course. He immediately joined the staff of the Lynn & Boston Street Railway, with duties in the motive power department. In 1903 he was appointed superintendent of power stations, with headquarters at Lynn, Mass., and for eight years was in charge of the design, construction and operating features of the ten generating plants of what is now the northern portion of the Bay State Street Railway system. Joining the Stone & Webster forces in 1911, Mr. Cargill devoted his attention chiefly to the mechanical side of power plant work, including reports and appraisals. He is a member of the New England Street Railway Club, the American Society of Mechanical Engineers, and is an associate member of the American Institute of Electrical Engineers.

OBITUARY

George W. Risser, associated with former Governor Haskell of Oklahoma in the promotion of the People's Electric Railway at Muskogee, is dead.

Robert A. Balfour, banker, broker, and who, with his brother, James G. Balfour, held much stock of the Union Traction Company, Philadelphia, Pa., died on Feb. 11 at his home in Germantown. He was forty-eight years old. Mr. Balfour was born in Rockdale, Delaware County, and came to Philadelphia with his father, Alexander Balfour, when a child. The elder Balfour died twelve years ago, and following his death Robert A. was elected a director in the Union Company to fill his father's place.

Charles H. Ladd, who for the last three years had charge, as superintendent, of the work done by the Stone & Webster Engineering Corporation, Boston, Mass., in El Paso, Tex., is dead. Mr. Ladd was graduated from Harvard University, in a scientific course, in 1900. After serving with various steam railroads, he entered the employ of the Houston (Tex.) Electric Company in 1905 as engineer of track and overhead lines. In 1906 he entered the service of the Stone & Webster Engineering Corporation and spent about a year as engineer of construction in connection with the rebuilding of track for the city lines in Houston. In 1907 he was transferred to Fort Worth as superintendent of construction. After two years spent in Arizona Mr. Ladd returned to the Stone & Webster organization at El Paso in the capacity previously mentioned.

D. G. Hamilton, for more than ten years president of the Chicago (Ill.) City Railway, now included in the system of the Chicago Surface Lines, died on Feb. 16 at his home in Chicago. Mr. Hamilton was born in Chicago seventy-three years ago. He received the degrees of A.B. and A.M. from De Pauw University and was graduated from Douglas University in 1867. He was president of the Anglo-American Land & Claim Association in Texas in 1890, and from 1889 to 1899 was president of the National Railway Company, the predecessor of the present United Railways of St. Louis. He was also president of the Texas & Central Mexican Railway. At the time of his death, he was resident director in Chicago of the Union Mutual Life Insurance Company of Maine, a member of the Chicago Historical Society, trustee of De Pauw University, a member of the Knights Templar and a Thirty-second Degree Mason. He belonged to the Chicago and the Union League Clubs.

H. Ward Leonard, electrical engineer and inventor, died suddenly of apoplexy on Feb. 18 as he was about to attend the annual banquet of the American Institute of Electrical Engineers. After graduation from the Massachusetts Institute of Technology in the early eighties, Mr. Leonard at the age of twenty-three became associated with the Edison interests, first with Mr. Edison personally and then in the installation and operation of Edison plants. In 1889 he was appointed general manager of the light and power department of the Edison Electric Manufacturing Company in New York and later of the Edison General Electric Company. In 1891 he established an independent manufacturing business, still operating as the Ward-Leonard Electric Company at Bronxville, N. Y. Mr. Leonard's inventions have been principally in the direction of systems of motor control, which were designed first for elevator service but later were adapted to railway locomotive use. Several electric locomotives in Switzerland and France have been equipped with this system.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Riverside, Rialto & Pacific Railroad, Riverside, Cal.**—Incorporated in California as a successor company to the Crescent City Railway Company. This incorporation means nothing more than that the Crescent City Railway has changed its name. There is no change in the management. This line, when it was built from Riverside to Crestmore, was incorporated. Since it was extended to Bloomington and Rialto it has operated without being incorporated. Capital stock, $500,000. Directors: William G. Henshaw, Tyler Henshaw, Henry Chickering and William Lees, Oakland, and William Metcalf, Piedmont, San Francisco. Headquarters of the company are at San Francisco.

***West Sacramento Electric Company, Sacramento, Cal.**—Incorporated in California to build electric railways and other public utilities in Sacramento. Capital stock, $100,000. Incorporators: Benjamin P. Lilienthal, San Francisco; Herbert W. Furlong, Pleasanton; William Berlitz, San Francisco, and T. T. C. Gregory, Suisun.

FRANCHISES

Pocatello, Idaho.—J. D. Browning has given the certificate of necessity and convenience for an electric railway in Pocatello over to J. R. Munn, who is asking for a franchise to build this line. The proposition is now before the Council. [E. R. J., Oct. 24, '15.]

Henderson, Ky.—The Henderson Traction Company has asked the Council for a franchise in Henderson. This is part of a plan to build an extension from Henderson to Owensboro.

Henderson, Ky.—The Evansville, Henderson & Owensboro Traction Company has asked the Council for a franchise in Henderson.

Greenfield, Mass.—The Connecticut Valley Street Railway has asked the Council for a franchise to extend its tracks along Silver Street in Greenfield.

Leominster, Mass.—The Worcester Consolidated Street Railway has asked the Council for a franchise in Leominster.

Salem, Mass.—Officials of the Bay State Street Railway have assured Mayor O'Keefe of Salem that they will soon build a loop line through the Castle Hill district. A franchise for the line was secured twenty years ago.

Kansas City, Mo.—The Metropolitan Street Railway has received a franchise from the Council to double-track its line on Sixty-seventh Street from Swope Parkway to Elmwood Avenue in Kansas City.

Geneva, N. Y.—The Geneva & Auburn Railway has asked the Council for a franchise to double-track its line on Exchange Street from Seneca Street to Lewis Street in Geneva.

Toronto, Ont.—The Humber Valley Electric Railway has asked the Ontario Legislature for an indefinite extension of time on its franchise in which to begin to build its electric railway through the Humber Valley from Lambton to the mouth of the Humber River and along the shore to Sunnyside. [E. R. J., Mar. 29, '13.]

Portland, Ore.—The City Dock Commission has approved the amended franchise of the United Railways, permitting the company to establish its electric lines in Stark Street and in Twelfth Street, between Burnside and Stark Streets, in Portland. The City Commissioners have approved the ordinance.

Philadelphia, Pa.—The Philadelphia Rapid Transit Company has received the approval of the Public Service Commission for a franchise granted by the Philadelphia Council for the right to extend its tracks on Leland Street in Philadelphia.

Marshall, Tex.—The Texas-Louisiana Traction Company has asked the Council for a franchise in Marshall. A. B. Blevins, Jefferson, president. [E. R. J., Jan. 23, '15.]

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—The extension to Corona has been completed by this company and will be placed in operation at once.

San Francisco (Cal.) Municipal Railway.—The Utilities Committee has advised the city engineer to proceed with the preparation of plans for the municipal railway across Golden Gate Park, the cost of which is estimated at $200,000. This amount is to be taken out of Geary Street Railway earnings. The line across the park is to be sunken and the crossings will be bridged over. The cost will be $50,000 more than for level construction.

San Rafael & San Anselmo Valley Railway, San Rafael, Cal.—This railway project has been abandoned by order of the Railroad Commission. About 5 miles of the line between San Rafael and Fairfax had been surveyed. E. S. Rake, San Rafael, president. [E. R. J., Nov. 21, '15.]

Connecticut Company, Bridgeport, Conn.—Plans are being made to begin work within the next few weeks on an extension from Stratford Avenue down Hollister Avenue and along the Lordship road to a point at Lordship Manor near the Stratford lighthouse. Arrangements for the construction of five bridges along the right-of-way have been completed and work on the structures will begin at once.

Palm Beach & Everglades Railway, West Palm Beach, Fla.—The 40-mile railway to be constructed between West Palm Beach and Lake Okeechobee will be operated by steam and not by electricity. H. G. Geer, West Palm Beach, vice-president. [E. R. J., Feb. 13, '15.]

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—It is announced that this company has awarded contracts for the construction of electric lines to connect Harrisburg, Marion, West Frankfort and Benton. Work will soon be begun. [E. R. J., Nov. 21, '14.]

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Contracts for grading have been awarded and work has been begun by this company on its line from Bonner Springs to Lawrence.

Union Traction Company, Coffeyville, Kan.—Plans are being considered by this company for an extension to Pryor, Okla. It would probably follow the old Oklahoma and Cherokee Central grade from Nowata to Pryor.

Boston (Mass.) Elevated Railway.—Plans are being made by this company to build at once the extension on the viaduct from Summer Street to Commonwealth Pier, then branch off to the Fish Pier in Boston.

Connecticut Valley Street Railway, Greenfield, Mass.—Plans are being made by this company to extend its tracks in Greenfield.

Detroit (Mich.) Railway.—This company has placed in operation its extension of the Crosstown line to Thirty-fourth Street and West Warren Avenue in Detroit. This line will connect the Crosstown line and Junction Avenue belt lines in Detroit.

Minneapolis & Central Minnesota Railway, Minneapolis, Minn.—Plans are being considered by this company to build a line between Little Falls and Pierz. E. G. Potter, 433 Andrews Building, Minneapolis, president. [E. R. J., Jan. 2, '15.]

United Railways Company of St. Louis, St. Louis, Mo.—Plans are being contemplated by this company for an extension of its Fourth Street line in St. Louis through the Lafayette Park district.

International Railway, Buffalo, N. Y.—E. G. Connette, president of this company, has announced that plans are being made to double-track the West Utica Street line on Ferry Street in Buffalo.

Yonkers (N. Y.) Railroad.—Early in the spring this company will complete the double tracking of the Park Avenue line in Yonkers by laying a double track from Ashburton Avenue to the terminal at Roberts Avenue, a distance of about 1½ miles. At the same time the company will double track the Mount Vernon line on Yonkers Avenue from Sherwood Park to Wilbur Street. A special layout is also to be laid at Nepperhan Avenue and New Main Street. According to general manager Leslie Sutherland the remaining single track portion of the railway will be double tracked as rapidly as the company's finances will admit.

Newbern-Ghent Street Railway, Newbern, N. C.—Plans are being made by this company to extend its lines in Newbern. Among the improvements planned will be a line from the Union Depot along Queen Street and Metcalf Street to New Street where it will connect with its present track which extends to the Norfolk Southern Railroad tracks in Riverside. It is also planned to extend the line in Riverside to Duffytown and through Reizenstein. These improvements will mean an expenditure of about $40,000.

Ohio Electric Railway, Cincinnati, Ohio.—This company has awarded a contract to H. C. Wolff, Chillicothe, Ohio, for 200,000 ties.

Cleveland (Ohio) Railway.—Plans have been made by this company for the renewal of 21 miles of track this year. It is said that 5 miles of track in addition should be re-surfaced. Within a short time this will be brought to the attention of the City Council. The largest section of track renewal contemplated is on Cedar Avenue between East Seventieth Street and Fairmont Boulevard. Short sections on many of the other lines have been selected for improvement.

Youngstown & Southern Railway, Youngstown, Ohio.—David Tod, receiver for this railway, states that the line will be double-tracked from Youngstown to Southern Park. He will petition the court to this effect soon and expects the request to be granted. A complete plan of reorganization for Youngstown & Southern Railway affairs is also under way.

***Tulsa, Okla.**—Surveys and preliminary arrangements for an electric interurban line between Collinsville and Tulsa are being made. The line will connect a number of towns between Nowata and Tulsa. No names are yet given of those interested in the project.

Aylmer, Ont.—A by-law will be submitted to the ratepayers to guarantee the bonds of the proposed hydro-radial line from Tillsonburg to London, by way of Brownsville, Springfield, Aylmer, Lyons, Belmont, Westminster and the London & Port Stanley line to London.

Wentworth Street Incline Railway, Hamilton, Ont.—The steam system of operation of this railway has been replaced by hydro-electric power supplied by the municipality of Hamilton. A storage battery has also been installed for emergency purposes. [E. R. J., Dec. 26, '14.]

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—Work on the Perth to Smith's Falls section of this railway will be begun in the spring.

West Stayton Power & Railway Company, Stayton, Ore.—Plans are being considered by this company to begin work in the spring on this proposed electric railway between Salem and East Stayton. E. O. Stafter is interested. [E. R. J., Aug. 30, '13.]

Lehigh Valley Transit Company, Allentown, Pa.—It is reported that this company expects to lay a new double-track between South Bethlehem and Hellertown, Pa. Surveyors are at work laying out a proposed electric line between Richlandtown and Hellertown. It is rumored that this company is behind the project. It is also reported that the company plans to build a short route for a fast line between Bethlehem and Philadelphia. Resurveys are now being made over what is known as the old North Pennsylvania route.

Lansdowne, Pa.—It is announced that plans are under way for the construction of an electric railway from Lansdowne Avenue and Baltimore Avenue in Lansdowne to East Lansdowne and Cardington, connecting with the Sixty-second Street and Spruce Street line of the Philadelphia Rapid Transit. It is reported that this line is to be leased by the Philadelphia Rapid Transit Company.

Pittsburgh, Pa.—John W. Reid, Colona, Pa., Edward Thomas and others, of Monaca, Pa., have incorporated with $250,000 capital and will soon ask for a franchise to build an electric line to make direct connections between East Liverpool, Ohio, and Pittsburgh. They propose to construct a line from Monaca to Aliquippa, where a connection will be made with the Woodlawn & Southern Railway and from another connection, near South Heights, on through to Cor-

aopolis, Pa., where the Pittsburgh Railways system will be met.

Kingsport, Tenn.—It is reported that work is to begin at an early date on the proposed electric railway from Kingsport to Newport. An office building has been rented in Greenville by those interested in the project. [E. R. J., Jan. 2, '15.]

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—This company is asked to consider plans for an extension of Third Street from Buford Avenue to Starr Street in Corpus Christi.

Gulf & Pecos Valley Railway, Lufkin, Tex.—As soon as financial arrangements can be arranged this company plans to build its 120-mile railway from Sabine Lake to Lufkin. R. B. Bledsoe, Lufkin, president, and the P. A. McCarthy & Sons Company, Lufkin, Tex., chief engineers. [E. R. J., Dec. 27, '13.]

Pier Railway, Port Arthur, Tex.—Work will be begun by this company about March 1 on its proposed line from the center of the city of Port Arthur at Procter Street and Austin Avenue to the end of the causeway on the pleasure piers in Port Arthur. [E. R. J., Oct. 5, '14.]

Southwestern Traction Company, Temple, Tex.—An extension between Cleburne and Ballinger is being contemplated by this company in the near future. There is a possibility of the proposed line being extended as far as San Angelo.

Ogden, Logan & Idaho Railway, Ogden, Utah.—After considering the matter for several months, directors of this company have definitely decided to build the Brigham City-Wellsville extension of the Idaho line by way of Collinston, Utah. The proposed route of the electric line extension follows closely the old route of the Utah Northern Railroad, crossing the divide into Cache County at Summit. Much of the material for this link of the railway, as well as that portion from Smithfield north to Preston, Idaho, has already been ordered and work on both portions of the extension will be rushed during the coming summer. It is believed by the officials of the company that the entire line from Ogden to Preston will be ready for operation by next fall. This will mean a continuous electric line between Provo, Utah and Preston, Idaho.

***Radford, Va.**—Plans are being made to build an electric railway between Floyd, Willis and Radford. About $500 has been subscribed by citizens of Radford. Among those interested are T. W. Simpson, John L. Vaughan, Shawsville, and W. J. Phillips, Willis.

Marietta-Parkersburg Interurban Company, Parkersburg, W. Va.—Within the next few months this company plans to begin work on its proposed 14-mile electric line to connect Parkersburg, Belpre and Marietta via the new bridge over the Ohio River between Parkersburg and Belpre. It is planned to use 90-lb. T rails. H. H. Archer, Parkersburg, is interested. [E. R. J., Jan. 19, '15.]

Sheboygan Railway & Electric Company, Sheboygan, Wis.—An extension to Elkhart Lake, Kiel, New Holstein and Chilton will soon be built by this company.

SHOPS AND BUILDINGS

Little Rock Railway & Electric Company, Little Rock, Ark.—Work has been begun by this company remodeling the building at 417 Main Street, Little Rock, to be occupied by the company's commercial department and salesrooms. The general office will remain at the present quarters, 115 West Fourth Street, Little Rock.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—Plans are being made by this company to move its offices from the present location in the Hicks Building to the corner of Eighth Street and K Street in Hoquiam.

POWER HOUSES AND SUBSTATIONS

Quincy (Ill.) Railway.—A new circulating pump, of 2400 gallons per minute capacity, is being installed in the power house of this company in Quincy.

Cleveland (Ohio) Railway.—The purchase of turbine generators for utilizing exhaust steam is under consideration by this company. A contract for supplying steam with the Cleveland Salt Works expires on July 1 and the question as to renewal must be decided soon.

Manufactures and Supplies

ROLLING STOCK

Columbia (S. C.) Railway, Gas & Electric Company is building six double-truck cars in its own shops.

Caldwell (Idaho) Traction Company will probably purchase during 1915 one passenger car and one substation.

Scranton & Binghamton Traction Company, Scranton, Pa., expects to purchase four new cars for its new extension.

Willapa Electric Company, Raymond, Wash., will order in 1915 one motor express car about 30 ft. in length, single-truck and of wood construction.

Metropolitan Street Railway, Kansas City Mo., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 6, 1915, as expecting to purchase fifty new cars, has ordered this equipment from the American Car Company. Brill trucks are specified.

TRADE NOTES

Westinghouse Traction Brake Company, New York, N. Y., has received an order to equip with automatic air brakes the interurban cars recently ordered by the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Lee H. Parker, for several years electric railway engineer with the Stone & Webster Engineering Corporation, Boston, Mass., has become president of the Spray Engineering Company, with headquarters at 93 Federal Street, Boston.

Union Switch & Signal Company, Swissvale, Pa., has received an order from the Northern Texas Traction Company to install six miles of T. D. B. signals on its Fort Worth-Dallas line between Boundary and Mountain Creek Spur.

C. W. Rhoades, formerly assistant sales manager in the railway department of Valentine & Company, Chicago, Ill., has been appointed railway representative of the Kay & Ess Company, Dayton, Ohio, in the territory included in the Mississippi River Valley.

Railway Appliances Company, Chicago, Ill., of which the entire capital stock was owned by Percival Manchester, has been sold to C. F. Quincy, president of the Q & C Company, Chicago, Ill. The business of the Railway Appliances Company will in the future be operated by, and in the name of, the Q & C Company.

Louis O. Duclos, for fifteen years sales manager of the Massachusetts Chemical Company, is about to enter into business for himself with headquarters in Boston. Mr. Duclos has developed a full line of insulating varnishes and friction tape, which he will market to electric railway repair shops, dealers and electrical contractors.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces the removal of the offices of its newly organized automobile equipment department from East Pittsburgh to Shadyside Station, Pittsburgh, Pa., where they will be located in the works devoted exclusively to the manufacture of Westinghouse automobile equipments.

Wasson Engineering & Supply Company, Milwaukee, Wis., has received an order to equip with its air-retrieving trolley bases all the cars on the new Kalamazoo-Grand Rapids line of the Michigan Railway, as well as the Grand Rapids, Holland & Chicago Railway, the former being a 2400-volt third-rail and trolley line and the latter a 1200-volt trolley line.

Coil Manufacturing & Repair Company, Cleveland, Ohio, which recently purchased the plant of the Cleveland Coil & Manufacturing Company, has enlisted the services of R. P. Pascoe, formerly manager of the latter company, succeeding Mr. Kuehle, recently resigned. Mr. Pascoe was formerly connected with the Van Dorn & Dutton interests as superintendent of their electric department.

Standard Underground Cable Company, Pittsburgh, Pa., has appointed A. B. Saurman, for the past twelve years Pacific Coast manager for this company, as southeastern manager, succeeding the late T. E. Hughes, with headquarters in Philadelphia. John P. Bell, for the past eight years assistant secretary and treasurer of the company, will succeed Mr. Saurman as Pacific Coast manager.

Prepayment Car Sales Company, New York, N. Y., has instructed its attorneys to carry its case against the Orange County Traction Company to the United States Supreme Court for review. The decision in this case in the United States Circuit Court of Appeals for the Second Circuit was mentioned on page 195 of the issue of this paper for Jan. 23. The company's case against Douglas Robinson as receiver of the Metropolitan Street Railway, mentioned in the same article, is handed down for retrial.

Cole, Ives & Davidson, New York, N. Y., is the name of a new engineering firm with offices at 61 Broadway, formed by the partnership of William W. Cole, 43 Exchange Place, and Arthur S. Ives and Rolland A. Davidson, composing the firm of Ives & Davidson, 84 William Street. Especial attention will be given to investigations and reports for financial interests, inventories and valuations of public utility or industrial properties and design. Installation or management of power plants of all descriptions.

O. C. Hirtzel severed his connection with the Westinghouse Electric & Manufacturing Company, February 1, and is now engaged in forming a corporation at North East, Pa., with a capital of $100,000, for the manufacture of street railway supplies, repair parts, drop forgings, etc. Mr. Hirtzel has been with the Westinghouse Company since 1912 as railway supply specialist of the detail and supply department at East Pittsburgh. Prior to that he was treasurer and manager of the Eureka Company, formerly the Eureka Tempered Copper Works, since the formation of that corporation nearly twenty years ago. The factory site has been selected at North East and as soon as the new organization is perfected up-to-date new buildings will be constructed. The new plant is expected to be in operation about July 1, 1915. The name of the new company has not yet been decided upon, but it is expected that an announcement regarding this will be made shortly.

Anthony J. Bemis, who has opened an office as consulting engineer in electric railway and lighting work at 39 South LaSalle Street, Chicago, has had a varied experience in the field of utility engineering, construction and operation. In 1898 Mr. Bemis joined the Stone & Webster organization as manager of their Maine properties, later becoming manager of the Breton & Plymouth Railway for two years. Another years was spent as manager of the Cape Breton Electric Company. From 1903 to 1905 Mr. Bemis represented the Stone & Webster properties at Savannah, Ga.; Jacksonville, Fla.; Columbus, Ga., and Tampa, Fla. In 1905 he was appointed general manager of the Grand Rapids-Muskegon Power Company, Grand Rapids, Mich., in charge of construction and operation. In 1909 Mr. Bemis joined the staff of the J. G. White & Company, acting for a time as general manager of the Oklahoma (Okla.) Railway. In 1912 he became engineer in charge of construction and operation for Elston, Clifford & Company, utility operators, Chicago, supervising construction of plants at Vicksburg, Miss., and Mineral Point, Wis. Mr. Bemis will retain his present connection with the Elston-Clifford company, but will devote his consulting engineering practice to reports, investigations and valuations of utility properties and advice on operating and commercial problems in connection with electric utilities.

Harry M. Hope, assistant engineering manager, Stone & Webster Engineering Corporation, Boston, Mass., will open an office for consulting electrical and mechanical engineering on March 1, 1915, in the Oliver Building, 141 Milk Street, Boston. Mr. Hope was educated in the grammar and manual training schools of Muskegon, Mich., and at Northwestern University and the Lewis Institute of Technology. During his grammar school course he had about one and one-half years' experience with the Muskegon Traction & Lighting Company. After installing a number of small electric lighting plants in Michigan he entered the testing laboratory of the Chicago Edison Company in 1902, being transferred in 1903 to the engineering department as draftsman in charge of the high-tension features of the Fisk Street station. During about five months of this time Mr. Hope also operated substations of the company. From 1904 to 1907 he was electrical engineer of the North Shore Electric Company, Chicago, and in June of the latter year he joined the staff of the Stone & Webster Engineering Corporation at Boston, becoming assistant engineering manager in 1911. Since taking up his duties with Stone & Webster Mr. Hope has been in charge of the design of transmission lines, substations and the electrical equipment of generating plants in many parts of the country and has made many investigations and reports on electric lighting, railway, hydroelectric and industrial properties.

ADVERTISING LITERATURE

Union Electric Company, Pittsburgh, Pa., has issued a price list of its Washington fir cross-arms for shipment from Pittsburgh stock.

American Oil Pump & Tank Company, Cincinnati, Ohio, issued a catalog describing its self-measuring and non-measuring oil pumps and tank outfits for paint, oil, varnishes, turpentine, lubricating oils, etc. Bulletins Nos. 201, 202 and 203 describe storage systems for these oils.

Esterline Company, Indianapolis, Ind., has issued a reprint of a description which appeared in the ELECTRIC RAILWAY JOURNAL of Jan. 16, 1915, of successful tests of the penetrating yet non-blinding qualities of this company's "Golden Glow" lamps, held on the lines of the Mobile Light & Railroad Company, which resulted in an order for ninety-two SM-95 headlights.

Ohmer Fare Register Company, Dayton, Ohio, has issued a reprint of an article written by B. F. Williams, a well-known educator of Des Moines, Iowa, entitled "Elements that Build for Better Business." The principles of correct relations between employer and employee laid down in the article are said by the company to be especially applicable to its fare register system.

Henry L. Doherty & Company, New York, N. Y., has issued a 14-page booklet calling attention to the present opportunity for investment and unusually attractive rates of income. It is stated that bonds and notes of public utility properties with stable and increasing earnings may be acquired at prices to yield from 4½ to 7¾ per cent. Among the specific issues described are included the first mortgage 5 per cent bonds of the St. Joseph & Savannah Interurban Railway, St. Joseph, Mo., the first mortgage 5 per cent bonds of the City Light & Traction Company, Sedalia, Mo., and the five-year 7 per cent convertible notes of the Cities Service Company, New York.

Bowman, Cost & Company, St. Louis, Mo., have issued "The Investor's Almanac" for 1915. The book contains more than 150 pages and is handsomely illustrated. "The Blue-book of American Investment," as the almanac has been called, treats of every feature of business economics and finance, with particular relation to the safety of American securities. This year's edition contains specially contributed articles from such financial authorities as Lawrence Chamberlain, Festus J. Wade and Louis Guenther. The tenor of these articles is optimistic. Mr. Chamberlain looks for an appreciation in security prices in the ensuing six months, Mr. Wade expects beneficial results from the Federal reserve system and advocates greater consideration for the railroads, and Mr. Guenther concludes that the wheels of industry will soon start to whirr with unwonted regularity.

NEW PUBLICATION

The Future of the Working Classes. By Roger W. Babson; Babson's Statistical Organization, Boston. 76 pages. $1.

This little book is really a treatise on the subject of the value of education to the working classes. The first section treats of the relations of labor and capital, and the second discusses the economic strife between three nations now at war—England, France and Germany. The writer's conclusions in the latter section, however, were based on peace conditions. The closing section offers the evidence which has led Mr. Babson to conclude that the working classes can become prosperous only through education. He deplores the fact that no part of the nation's educational system is devoted to alleviating strikes through training youths in the fundamentals of character and economic intelligence. It is recommended that those interested in the future of the working classes look to education rather than to arbitration and the courts.

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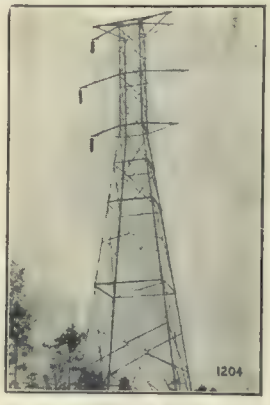
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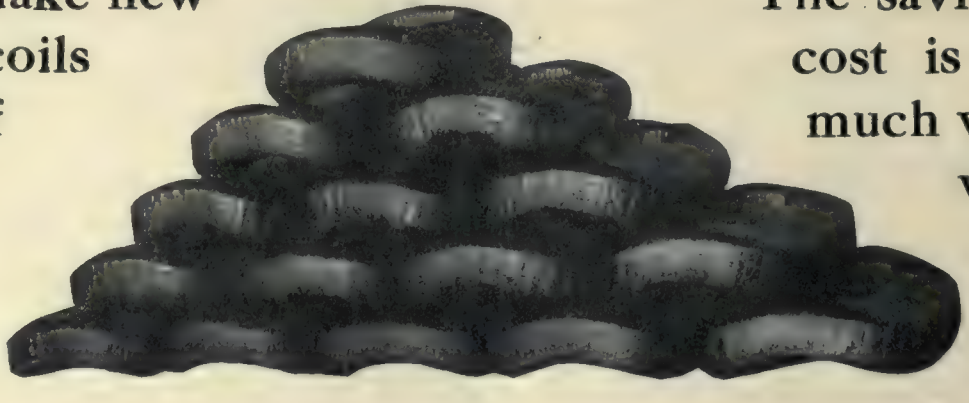
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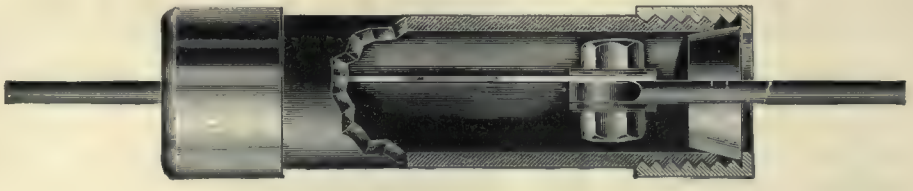
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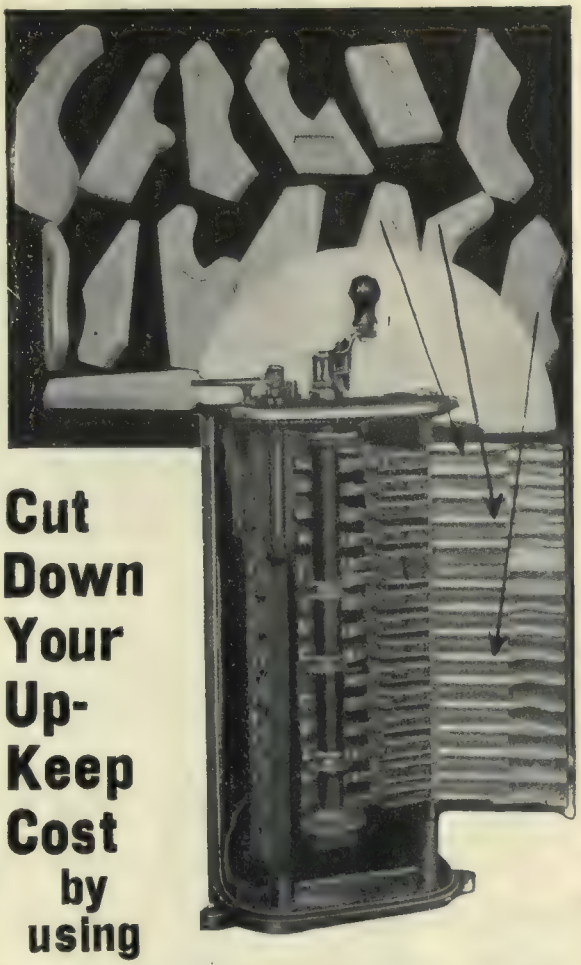
"I had the fright of my life this morning, George. You see, it was this way. I was late, and seeing a car standing at the corner with several persons getting on, I thought I could make it. But just as I had one foot on the step of the car, the conductor rang the bell to go ahead. I thought my day had come, George, but what do you think? The car didn't budge. I found out the reason afterward.

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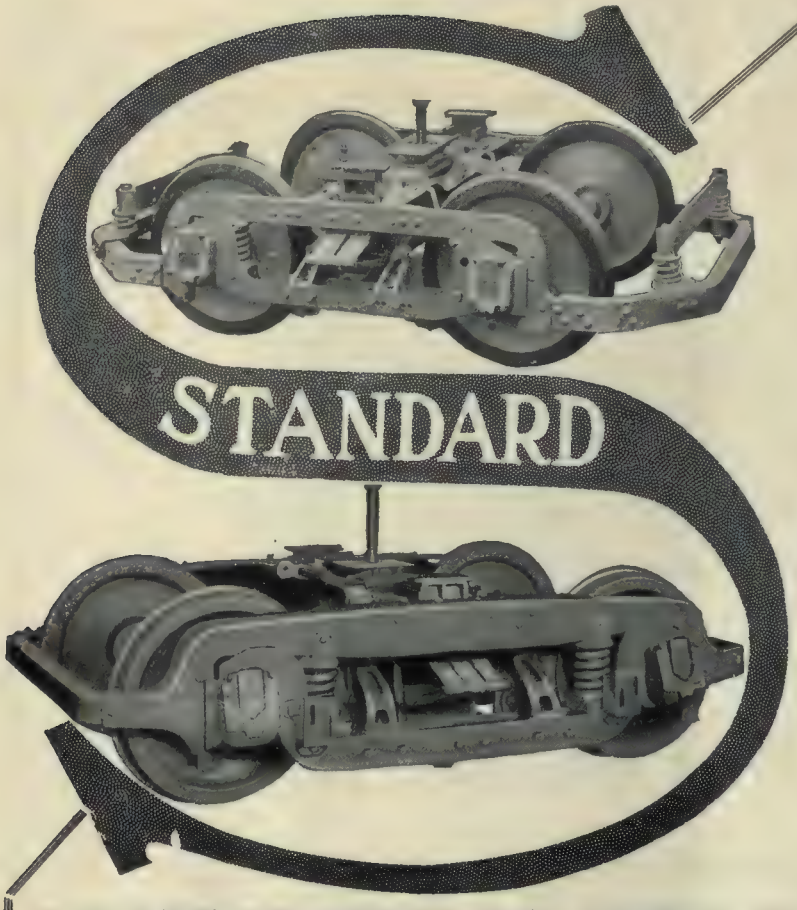
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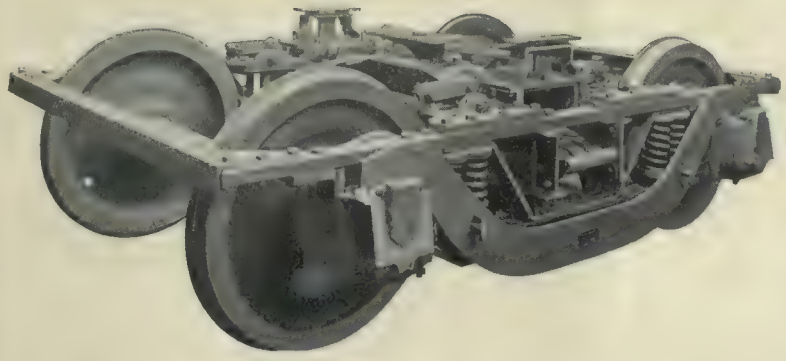
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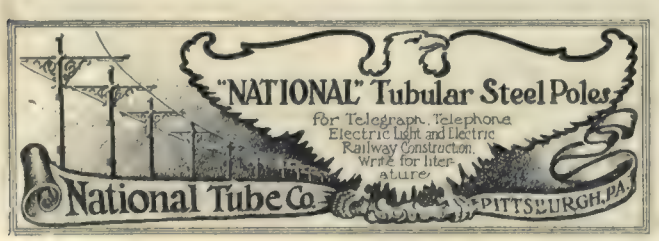
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Northern Electric Company
LIMITED
Distributors for Canada.

Riveted Corrugated Culverts?



A Carload of Our "IMPERIAL" Riveted Corrugated Anti-Corrosive NO-CO-RO METAL Culverts.

We make two styles of Culvert. Our standard—the BEST culvert in the field—is the "ACME" (Nestable) Corrugated Culvert, made only of Anti-Corrosive, NO-CO-RO Metal, in Standard and heavy gauges. Our second grade is

IMPERIAL
RIVETED CORRUGATED CULVERTS

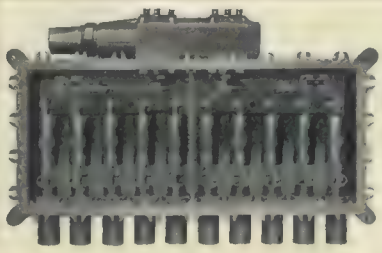
made of STEEL, or of NO-CO-RO Metal, in either LIGHT or heavy gauge. The manner of construction, the high purity of NO-CO-RO Metal and the better workmanship of "Imperial" will justify you in making this your choice for the riveted type culvert. Catalog G-3.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Manganese Steel Center Layouts

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Standard Underground Cable Co.
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Don't Be Delayed on Conduit Delivery—Order

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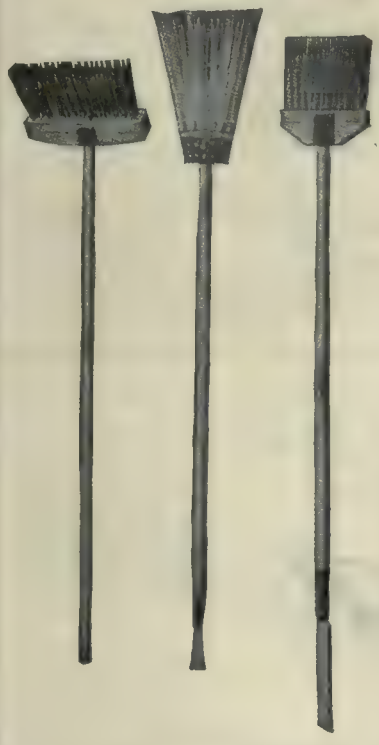
THE FIBRE CONDUIT COMPANY
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Send for Book "R"



A Great Combination



No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them. Write for Prices.

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Hydraulic Compressor No. 61

An efficient compressor for installing railway bonding; weighing only 115 lbs., but having a pressure exerting capacity of 70,000 lbs.

One compression with this machine on the terminal stud is sufficient to secure straight, smooth and clean bonded installations.

Built on an entirely new plan—strength and durability being features of its design. Its compactness and simplicity recommend it for the use of unskilled labor. Free from valves or other intricate parts, it is the ideal compressor for all conditions. Our No. 21 Drilling Machine, together with this Hydraulic Compressor, constitutes an equipment meeting railway bonding requirements with the hghest efficiency.

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4

FROGS, SWITCHES, CROSSINGS
SWITCH-STANDS, RAIL BRACES

The Cincinnati Frog and Switch Company
Cincinnati, Ohio

ESTABLISHED 1882

The Weir Frog Company

Manganese Track Work

Cincinnati, O.

Hundreds of Installations of



Falk Track-Work

are proving it worthy of your fullest consideration

Let us figure on your requirements

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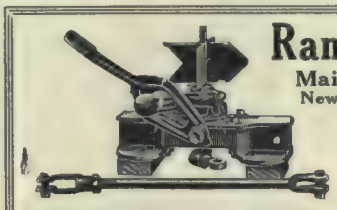
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was designed after a thorough investigation of the work to be done. It is especially adapted to the peculiar requirements of Electric Railway Companies.

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Lorain, Ohio



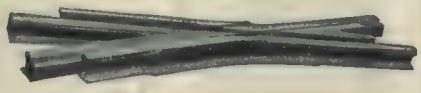
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Crossings, Switches, Etc.

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SWITCHES, ETC.
OUR SPECIALTY



St. Louis Steel Foundry, 1560 Kienlen, St. Louis, Mo.

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TOOLS

for all classes of electrical construction and repair work. Write for catalog.

Mathias Klein & Sons Canal Station 25 **Chicago**

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you'll find that Dearborn Feed Water Treatment is saving money and trouble for the steam plant operators—year after year.

Our customers are numbered by thousands—we analyze over 8000 samples of feed water annually—and prepare treatment for the special conditions at each plant, that prevents the trouble caused by the boiler water, whether it be scale, corrosion, pitting or foaming.

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TRACK SPECIAL WORK



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Built along quality lines to withstand long, severe service.



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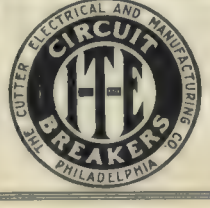
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Write and let us tell you all about it.

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This is the cry of every industry. In yours it is attained by using

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Originators of the Oxweld Process

Full information on all classes of Welding and Cutting will be sent on request.

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Built by

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For thirty-one years the Standard

Weatherproof Tape Solid Compounds Baking Varnishes
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FOR CAR HOUSES

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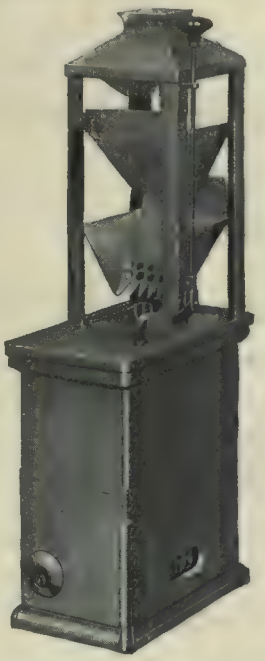
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Stops Noise and Wear in the Gear Cases
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Service and Durability — The Test of Economy
AMERICAN VULCANIZED FIBRE
will meet both requirements of this test if you will use it for Track Insulation.
Write for our Bulletin "For Safeguarding Safety Signal Appliances."
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Order from our Chicago or Elsmere factory, whichever is nearer, and delivery will be made without delay.
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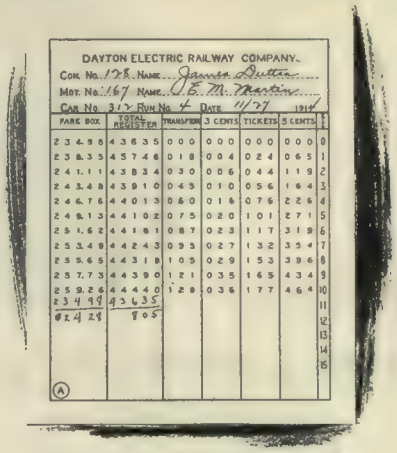
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Always ready for use.
Takes both tickets and cash fares.

CLEVELAND FARE BOX CO.
CLEVELAND, OHIO

The Car Cash Register


DAYTON ELECTRIC RAILWAY COMPANY.
Con. No. 178 Name James Dutton
Mot. No. 167 Name O. E. M. Martin
Car No. 317 Run No. 4 Date 11/27 1914

Fare Box	Total Register	Transfers	3 Cents	Tickets	5 Cents	
23498	43635	000	000	000	000	0
23835	45746	018	004	024	065	1
24111	43834	030	006	044	119	2
24348	43910	045	010	056	164	3
24676	44013	060	016	076	226	4
24813	44102	075	020	101	271	5
25162	44181	087	023	117	319	6
25348	44243	095	027	132	354	7
25565	44318	105	029	153	396	8
25773	44390	121	035	165	434	9
25926	44440	128	036	177	464	10
23499	43635					11
02429	805					12
						13
						14
						15

Trip record card, ¼ size, produced on

DAYTON Computing Fare-Box Recorder

Hardly a retail store in the land lacks a cash register. The daily income of a trolley car on a busy route would make some of these stores sit up and take notice. Is this income worth protecting?

Write for our trial proposition.

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Dayton, Ohio

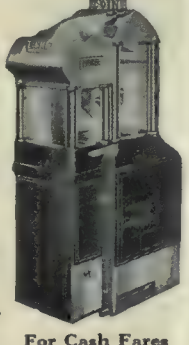
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The JOHNSON Registering Fare Box


For Cash Fares

—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.

Johnson Fare Box Company
Jackson Blvd. and Robey St. CHICAGO
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For Cash Fares and Tickets



Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

These punches prove the most efficient, because they operate quickest and easiest, and the most economical because they wear longest.

Let us show you WHY.

Punchmakers since '72.

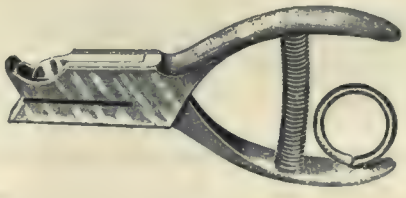
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E. G. Long Co., 50 Church St., New York City
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B-V Visible Punches

The Choice of the Conductor



Let your old, experienced conductors—the men who have used all kinds and makes of punches—choose the kind they prefer. Unanimously they'd vote for B-V. Why? Because the clean-cutting qualities of the tool steel dies and the speed of the visible feature are the essentials of quick and efficient service. Write for list.

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Factory: Newark, N. J.

71692

One Lamp burned out may plunge a series lighted car in darkness

—but not if you're equipped with



Nichols-Lintern Selector Switches

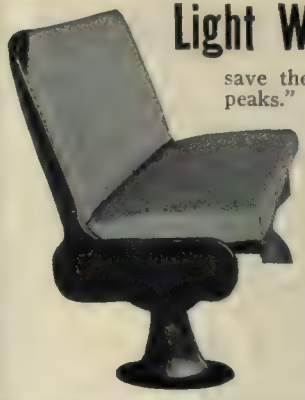
Nothing is more annoying to passengers than to have the lights go out. It arouses uneasiness in all, in some, *panic*. By simply turning the knob of the Nichols-Lintern Selector Switch a new lamp is cut into the place of the burned-out one. Light is restored at once—no trouble—no delay—no annoyance. Get details.

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save the drain on current at "traffic peaks."



WALKOVER
Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

Hale and Kilburn Company
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PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

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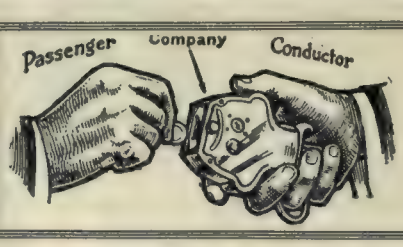
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THE RAPID READY CHANGE CARRIER



25 - 10 - 5 - 1 or 5

enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, $1.75.

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Direct Automatic Registration By the Passenger

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THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

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Car Gongs of all kinds

Rotary and Single Tap Gongs

"UTILITY" Electric Thermometer Control SAVES 70% In Heating Current

"UTILITY" Ventilators Represent the Highest Efficiency—Various types to Meet All Conditions

RAILWAY UTILITY CO. Chicago and New York

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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"Correctly Balanced" More-Jones Trolley Wheels

By original methods we insure a precision of balance in trolley wheels **when they are cast,** without using "rapped" molds. This perfect balance results in minimizing arcing troubles, insuring long life of wheels even under highest-speed conditions. Made in 48 styles and sizes to **fit all harps.** Highest quality of metal and precision machining insure superior construction.

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More-Jones Brass & Metal Company
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1

Whether the Fire Causes the Arc or the Arc Causes the Fire



Pyrene protects you. Broken wires and imperfect contacts often start serious fires. And fire in railway power-houses by attacking insulated cables sets up "shorts" resulting in furious arcs. But—arc or fire—

There is Safety in

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FIRE EXTINGUISHER

It Gets Both

Pyrene has in actual emergency service extinguished arcs of a potential as high as 66,000 volts. The high dielectric strength of Pyrene broke the arc and protected the operator. A few seconds use of Pyrene extinguishes the most intense flame or arc. Write for data.

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SAFETY FIRST — ECONOMY renewable cartridge FUSES

SAFETY FIRST—ECONOMY NEXT

Non-renewable fuses are an expense. A good, renewable fuse is an investment.
The only good Renewable Fuse on the market is marked "Economy"

Write for Catalog No. 2 and Bulletin

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Efficiency
Economy
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A WASSON
TROLLEY BASE
Soon Pays for Itself
Order One Today
and Convince Yourself
WASSON ENGINEERING & SUPPLY CO.
MILWAUKEE, WISCONSIN

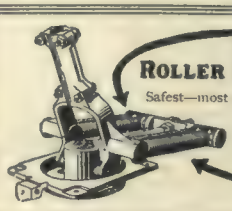
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Used by 153 Railroads

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SIMPLEX
ROLLER BEARING TROLLEY BASE
Safest—most economical. Tension INCREASES as pole goes UP, decreases as pole comes DOWN. No more bent poles or knocked down wires. Full particulars from
THE TROLLEY SUPPLY CO.
Canton, Ohio

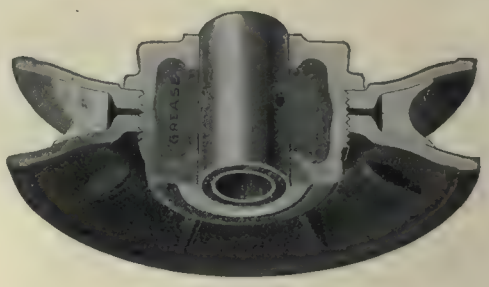
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MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71608 4

No Lubrication



Universal Trolley Wheel

It lubricates itself. Large grease cups in the hub provide lubricant as long as the wheel lasts, and some of our users tell us that its life is twice as long as many.

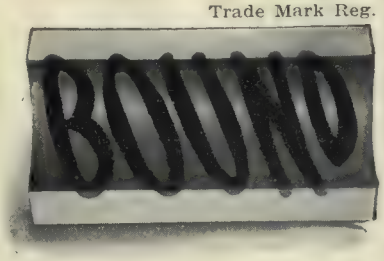
Built with a special harp, contact spring, bushing and pin, that all make a saving in time and cost.

THE PRICE WILL INTEREST YOU.

The Universal Trolley Wheel Co.
Northampton, Mass.
AUTOMATIC VENTILATOR CO., Sales Agent
2 Rector Street, New York City
9484

1915 "Bound Brook" Bushings are made like this

Trade Mark Reg. U. S. Pat. Off.



for your protection



Genuine "Bound Brook" Bushings insure you minimum trolley wheel cost. Our million-a-year sales are the well-earned reward of quality service. Be sure you *get* this service.

All Genuine Graphited "Oilless Bearings" have always been made at Bound Brook, N. J., in the United States of America.

Specify "Bound Brook"

Graphite Lubricating Co., Main and John Sts., Bound Brook, N. J.
7252

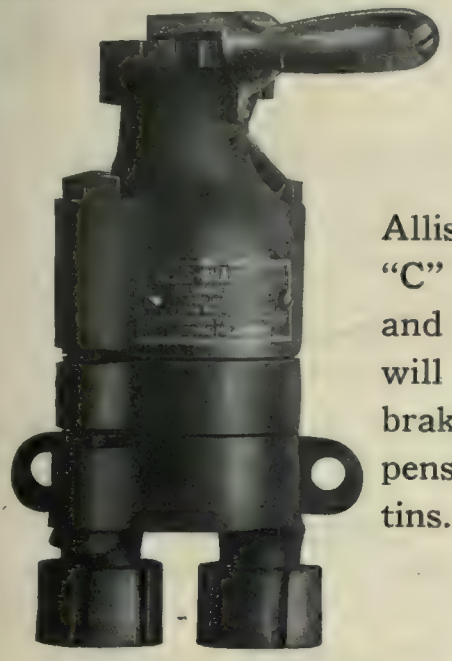
"Watch Your Step"

If it has
Universal Safety Tread
on it
Proceed in Safety.
If Not
Be Careful

Universal Safety Tread Co., Waltham, Mass.
New York Philadelphia Chicago

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

UNION SPRING & MANUFACTURING CO.
SPRINGS COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office, Oliver Bldg., PITTSBURGH, PA.
Works: New Kensington, Pa.
149 Broadway, New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.



Allis-Chalmers Type "C" Engineers' Valves and OB-4 Governors will reduce your air-brake maintenance expense. Write for bulletins.



Allis-Chalmers Manufacturing Company

Milwaukee, Wisconsin

For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada

Offices in All Principal Cities

Foreign Representatives

H. I. Keen.....732 Salisbury House, London Wall, E. C., England
Mark R. Lamb.....Huerfanos 1157, Casilla 2653, Santiago, Chile
Herbert Ainsworth.....Johannesburg, South Africa
American Trading Co., Representatives in China, Japan, South America and Philippine Islands



Getting the *Most* out of Brakes

Most mileage—most safety—most ease of handling—most economy—these and other direct returns accrue from the

S-W BRAKE AUTOMATIC SHIM SLACK ADJUSTER

It is simple and positive in action—the shims take up the slack as shoes wear. An emergency always makes it act. It cuts out pit-work at the car barn. WRITE FOR THE BULLETIN.

The Sauvage-Ward Brake Co., Inc.

Whitehall Building, New York

9380

"Hard Service"

Railway Motor Gears and Pinions

have for years consistently represented SUPERIORITY, and appeal to the man who considers EFFICIENCY as well as first cost. Supplied in four grades: Standard, Special, Treated, Hardened.

THE VAN DORN & DUTTON CO.

Gear Specialists

CLEVELAND (Sixth City)

NEW YORK LOS ANGELES SAN FRANCISCO

TULC

THE SAVING BY THE USE OF

TULC

EQUALS

THE COST OF WASTE
COST OF ARMATURE REPAIRS
ONE-HALF OF THE COST OF BEARINGS

CLEAN—EASY TO HANDLE—READY TO INSTALL

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

SEARCHLIGHT SECTION

FOR SALE

10—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
30—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Trucks.
2—Jackson and Sharp 18′ Bar Bodies.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
10—Wason 10 Bench Open Cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 Bench Open Cars, West. 12A Motors, Brill 21E Trucks.
8—Brill 14 Bench Open Cars, West. 56 Motors, Brill 22-E Trucks.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars complete, 4 G.E. 1000 motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
20—G.E. 80 Railway Motors complete.
12—G.E. 54 Railway Motors complete.
60—G.E. 1000 Railway Motors complete.
60—G.E. 800 Railway Motors complete.
40—West. 12A Railway Motors complete.
32—West. 49 Railway Motors complete.
8—West. 38B Railway Motors complete.
10—West. 112 Railway Motors complete.
4—West. 68-C Railway Motors complete.
4—West. 68 Railway Motors complete.
12—G.E. 73 Railway Motors complete.
24—G.E. 87 Railway Motors complete.
20—G.E. 57 Railway Motors complete.
3—West. 101-B2 Armatures, brand new.
3—West. 93-A2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
22—K6 Controllers.
44—K11 Controllers.
28—K2 Controllers.
62—K10 Controllers.
30—K14 Controllers.
28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheel base.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheel base.
10—Dupont Trucks, 7′ 6″ wheel base.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street, NEW YORK N. Y.

MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.
2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

An Unusual Bargain

One double truck, single track snow plow, length over all 40 ft., width 8′6″, height 10′9″, truck centers 13′8″. wheel base 4′. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

Price $1,000, F.O.B. Rensselaer, New York.

Albany Southern R. R. Co.
Rensselaer, N. Y.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

FOR SALE

Two Snow Plows: One Sprinkler: Cars, Motors, Rails, Generators. Everything for Track, Rolling Stock, Power Plant bought and sold. Send us your requirements.

Write for our Lists and Catalogs.

Railway & Power Equipment Co.
Charles F. Johnson P. O. Box 155 Ellicott Sq., Buffalo, N. Y.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

150 K.W. Motor Generator Set

1—220 H.P., 3 phase, 60 cycle, 2080 volt, 514 R.P.M., General Electric induction motor, direct coupled to 150 K.W. General Electric, 550 volt, CLB, compound wound generator. Instant shipment.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.

Complete with coupling and panel.

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

8—West. 112 Motors, 75 H.P., newly rewound.
5—Type M, Single End Control for 4 motors, 75 H.P. ea.
2—K. 14 controllers.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338-4339 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

EXPERIENCED man wishes to change position. Has qualified as general superintendent, superintendent, constructing and operating engineer. Age 45, 24 years' experience. Identified with two very large and conspicuous engineering, constructing and operating developments. First—Hydro-electric, transmission, transformation and distribution, 8 years. Second—High tension, transmission, transformation for large electric railway, 6 years. Now holding a very important position with one of the largest illuminating companies. Specially qualified to handle engineering, construction, maintenance, and operation of an extensive transmission and distribution system, either for railway or lighting purposes. Very successful on organization, efficiency and economy. Sixteen years' record as a producer of results. References, present and past employers. Box 656, Elec. Ry. Jour.

EXPERIENCED man, age 32, wishes to change position, any location. At present employed as assistant superintendent transportation. Twelve years present employer. Thoroughly experienced on time tables, and general transportation duties. A1 references. Box 685, Elec. Ry. Jour.

HUSTLING young manager of electric railway and light companies open for engagement immediately. Experience, references, etc.; will pass Missourian investigation. Especially able on public policy. Box 690, Elec. Ry. Jour.

MASTER mechanic open for immediate engagement. Long experience, reliable and unquestioned ability. Best references. Box 684, Elec. Ry. Jour.

POSITION wanted by a man who has had 18 years' experience as superintendent and roadmaster and constructing street car lines. Best references. Box 691, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.	11.60
1-4 page,	20.00	8 in. single col.	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

PRACTICAL engineer, many years' experience, seeks position as General Supt., supt. motive power or master mechanic; wide experience all branches both mechanical and electrical from power house to track, including operation; expert in car design and maintenance; best references. Box 662, Elec. Ry. Jour.

STOREKEEPER, thoroughly acquainted with all electric railway material and accounts, desires change. Can cut the mustard in regard to efficiency and economy. Box 674, Elec. Ry. Jour.

WANTED—A position as barn foreman or master mechanic of a road of about 75 cars. Strictly sober; 15 years' experience in remodeling old cars; also equipping new cars. Can give past and present references. Can come at once. Box 682, Elec. Ry. Jour.

WIREMAN—Experienced on all types of equipment and cars. Old and new work. Have also general car barn experience. Armature winding. Can you use me? Box 686, Elec. Ry. Jour.

YOUNG man desires position as auditor of electric railway company. At present so employed. Best of references. Box 679, Elec. Ry. Jour.

POSITIONS VACANT

WANTED—Bookkeeper, young man, to take charge of set of books of street railway company; must have had previous experience and be able to furnish satisfactory references. Give both in application. Address Box 668, Elec. Ry. Jour.

WANTED—A thoroughly reliable and competent general freight and passenger agent. A good opening for one thoroughly posted in all details of the passenger traffic business with some knowledge of freight traffic. Location, Middle West. Give full information regarding experience, standing and salary desired. Address Box 681, Elec. Ry. Jour.

MISCELLANEOUS

Car Heaters Wanted

Wanted—About twenty-five used hot water car heaters. Must be in good condition. Address Box 688, Elec. Ry. Jour.

FOR SALE

Chestnut Poles For Sale

We furnish A, B, C and E grades in any length, 20′ to 75′ and stubbs, chestnut poles and R.R. ties, locust posts and hardwood lumber and timbers. A good stock of poles on hand. Can make prompt shipments. Address Lewis Lumber Co., Relief, N. C.

For Sale—Cheap—Electric Heaters

110 volts, or can be used five in series for 550 volts. Used, but in good condition. Inquire Purchasing Department, Empire United Railways, Inc., 112 West Genesee Street, Syracuse, N. Y.

25-Tons 6″ HIGH "T" RAILS

POLES AND PILING

NEW CYPRESS. PRICES LOW.

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
St Louis

New and Relaying Rails,—Equipment—Tanks—Etc.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Service.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co.
Western Electric Co.
Woodman Mfg. & Sup. Co., R.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carbon & Battery Co.
Protective Signal Mfg. Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.
St. Louis Car Co.

Bearings, Oilless, Graphite, Bronze & Wood.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Protective Signal Mfg. Co.
Reiter, G. C.
St. Louis Car Co.
Trolley Supply Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blow Torches for Soldering and Brazing.
Prest-O-Lite Co., Inc., The.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Imp. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Creaghead Engineering Co.
Electric Railway Equip. Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Adjusters.
Anderson Brake Adjuster Co.
Sauvage-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
National Brake & Electric Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Bridges & Buildings.
American Bridge Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Nungesser Carbon & Battery Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal.
American Bridge Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. .
Niles Car & Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.
Internal Combustion Loco. Co., Inc.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American Bridge Co.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.
Trolley Supply Co.
Wasson Engrg. & Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Chas. F. Etter.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
Electric Operations Co.
General Electric Co.
Roebling's Sons Co., J. A
Western Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coil Impregnation.
Electric Operations Co.
Federal Electrical Mfg. Co.

Coin-Counting Machines.
International Register Co.
Johnson Fare Box Co.

Commutator Slotters.
American General Engrg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Engrg. Co.
General Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cameron Electrical Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co., Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Westinghouse Trac. Br. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.
Tubular Woven Fabric Co.



Maintenance

In China, when a road gets bad they strengthen their cart wheels.

The reasoning is upside down, but they get some kind of results that way, so they figure that they have the right idea.

This custom has a pretty close analogy to the practice of tightening up the spring tension on railway motor brushes when track conditions are bad.

The shop man figures that because the brushes chip off, it is due to a hammering action when going over rough track, but the chances are that it isn't that at all.

If brushes chip — they are *wrong* brushes, and we can prescribe the *right* Morganite brushes to overcome the trouble.

To do this is a part of Morganite service, and it saves the railway lots of good money.

The Morgan Crucible Company Limited
120 Liberty St, New York City

Factory, Brooklyn

AGENTS:

Lewis & Roth Co., 312 Denckla Bldg., Philadelphia

Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

361

The Highest Development

In Very Small Indicating Instruments for Direct Current

is marked by the

Weston

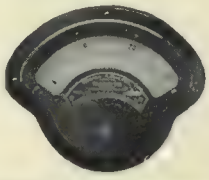


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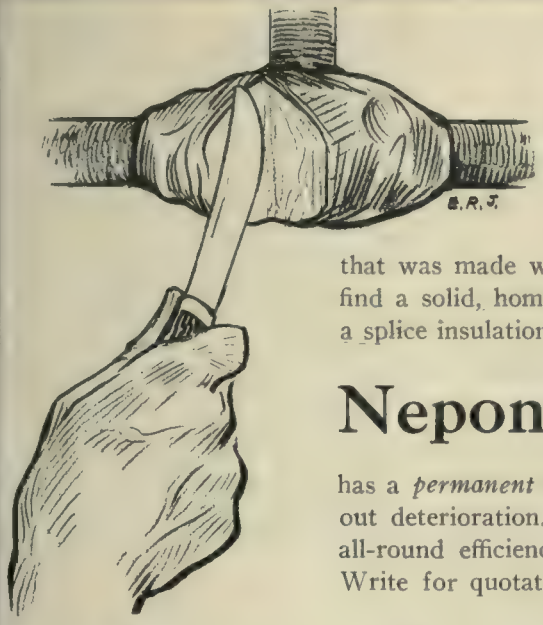
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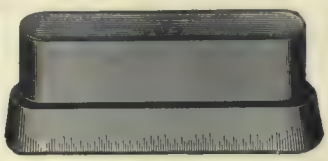
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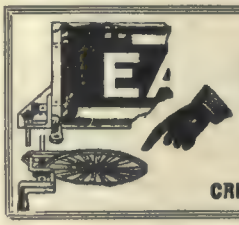
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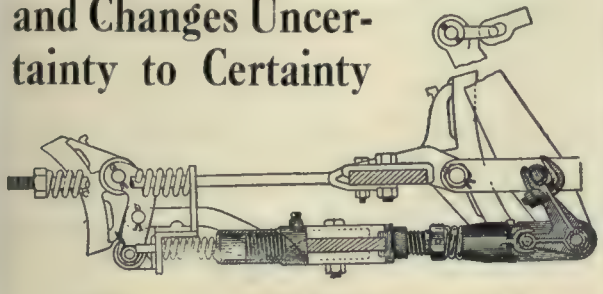
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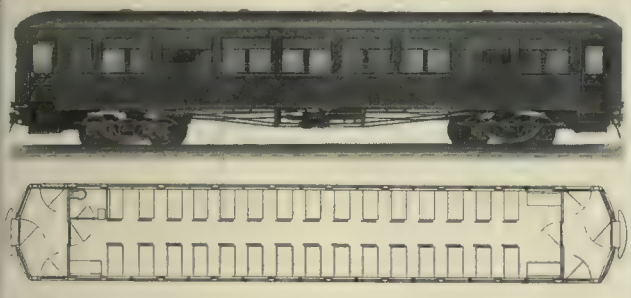
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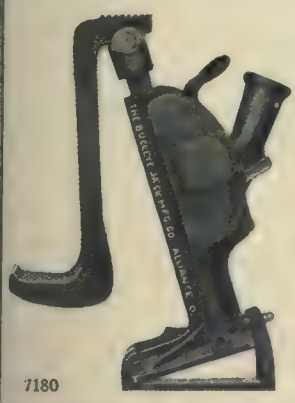
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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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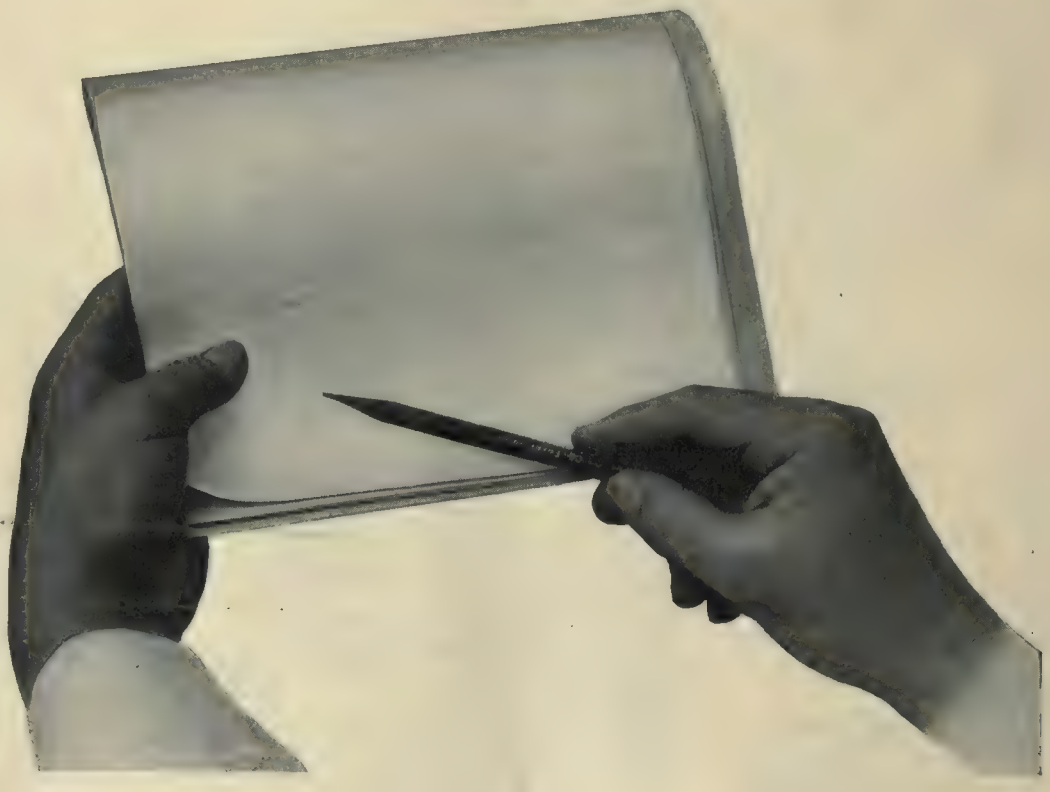
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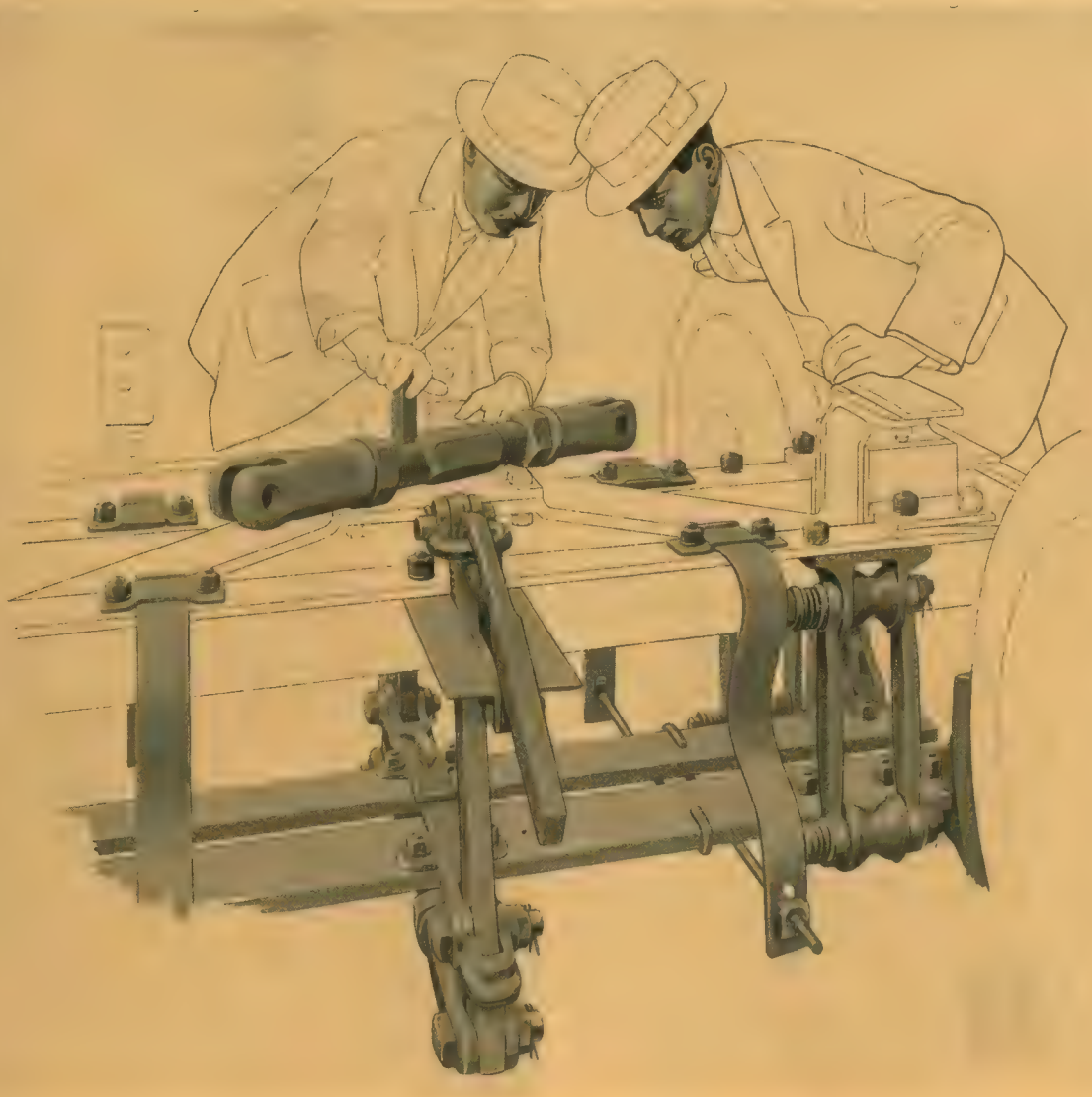
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BRILL No. 76-E TRUCK

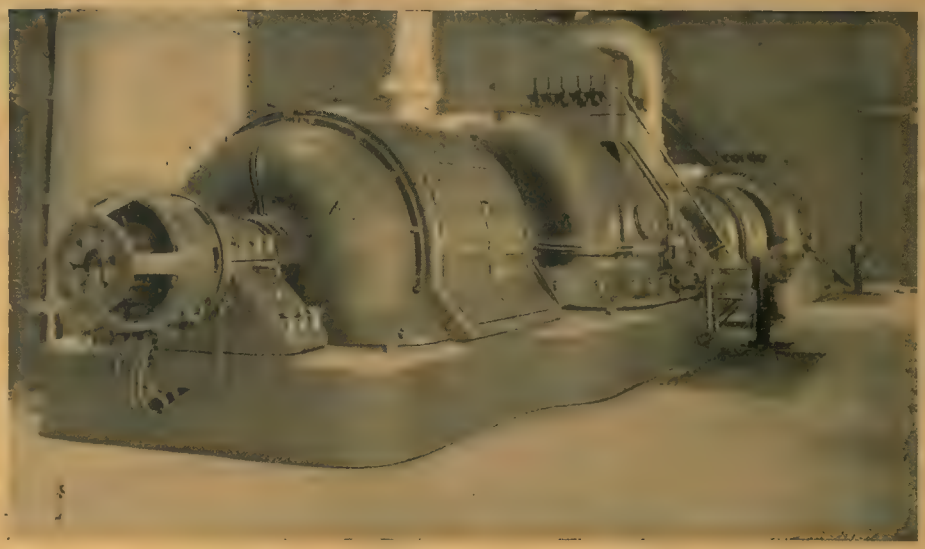


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LECTRIC RAILWAY JOURNAL

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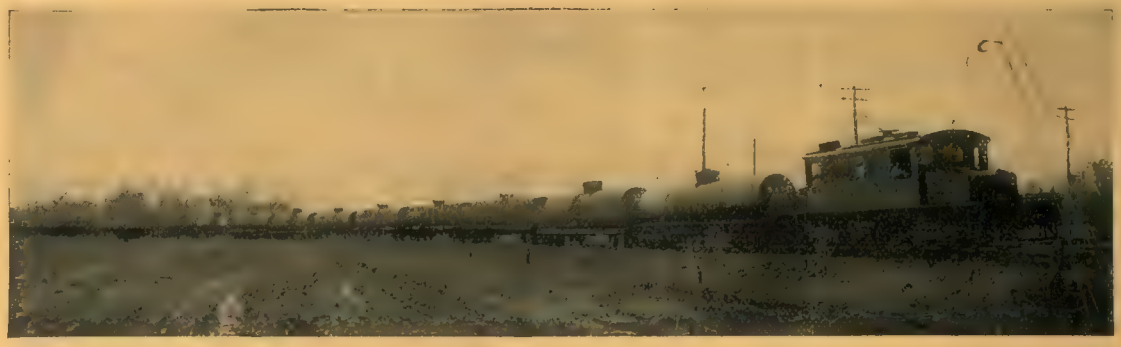
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East Pittsburgh Pennsylvania

Electric Railway Journal

New York, February 27, 1915

Volume XLV No. 9

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The author, John Leisenring, signal engineer Illinois Traction System, gives a description of the new installations made by the company during the past year, including three special cases where complicated track arrangements required the use of intermediate signals instead of preliminaries, as well as individual treatment in locating the signals.

ELECTRIC RAILWAY JOURNAL, Feb. 27, 1915. 6 cols.

Annual Convention of C. E. R. A. 411

Letter from Governor of Indiana, and Addresses by Chairman of Public Service Commission, Mayor of Indianapolis, and prominent representatives of American Association part of first day's proceedings. Paper on baggage and report on standard charges for repairs on foreign equipment also presented.

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The Cost of Bus Operation 414

Actual figures on the cost of operation, including those furnished by the supporters of the motor-driven vehicle, show that the true cost of transportation by the automobile is greater than by the electric railway, and that frequently even the unregulated jitney operates at an actual loss.

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American Association News 418

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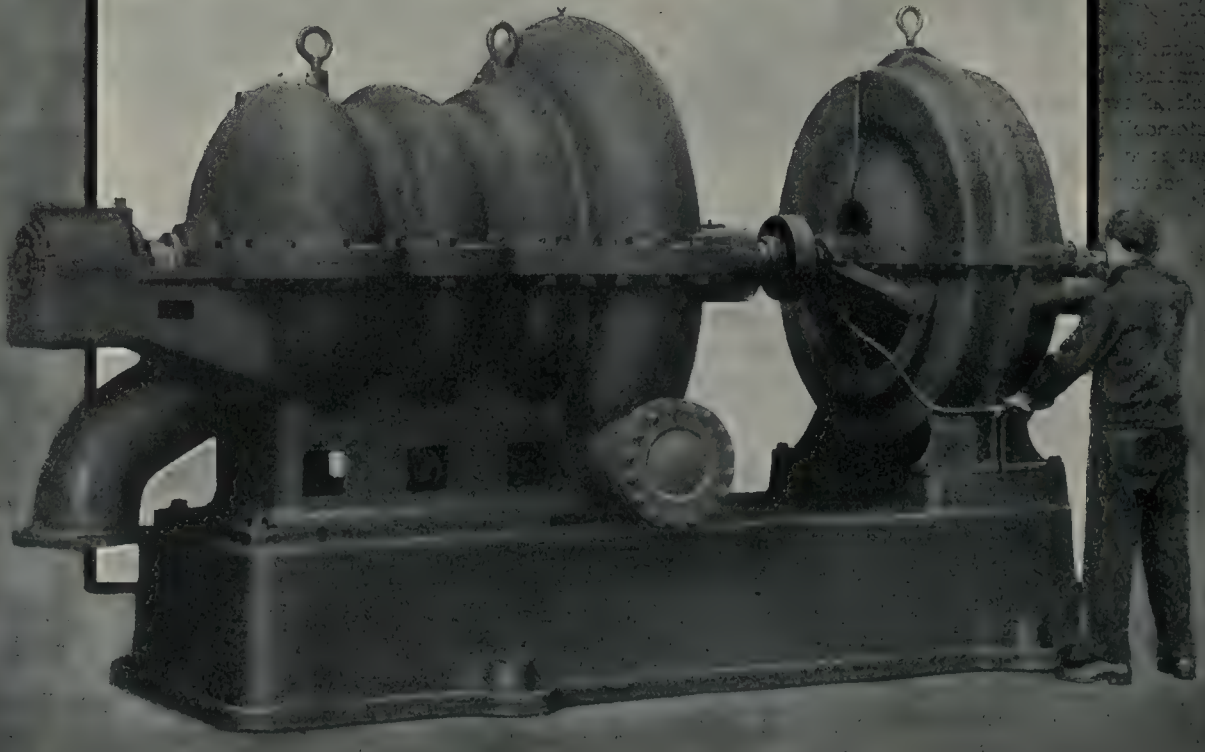
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THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

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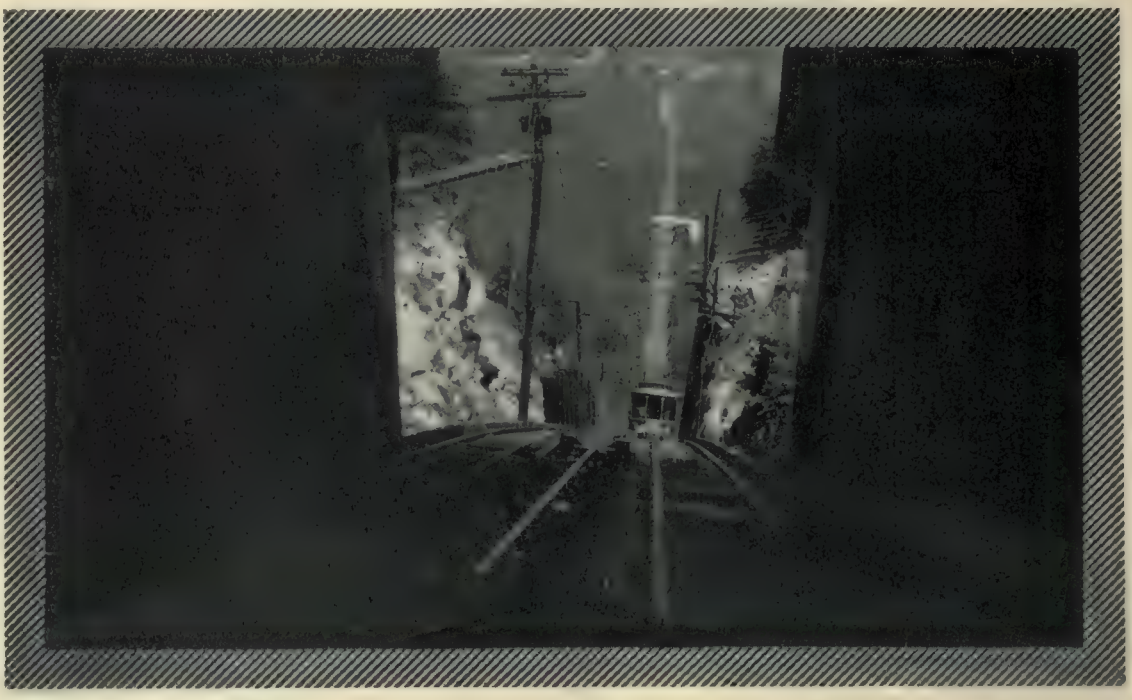
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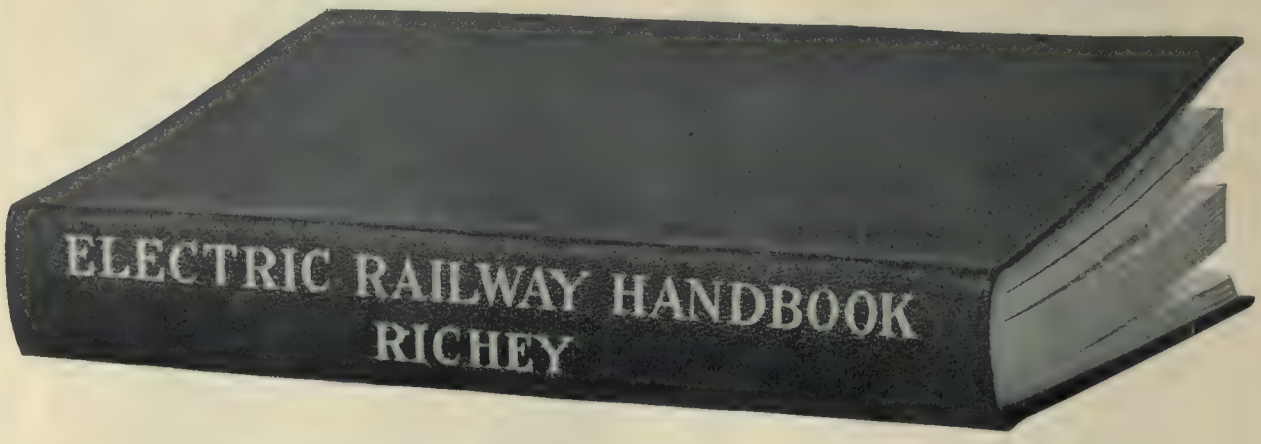
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has found that move to be one which contributed to operating profits. The elimination of accidents, the augmented passenger comfort, and the increased receipts due to the elimination of missed fares have made the charge for the work and investment required to produce the designs and devices represented by the Prepayment patents, one of the most productive investments that any road can make.

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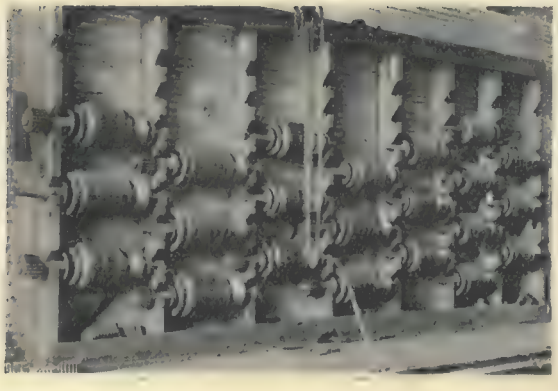
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March 20th

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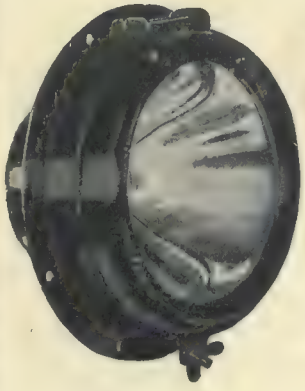
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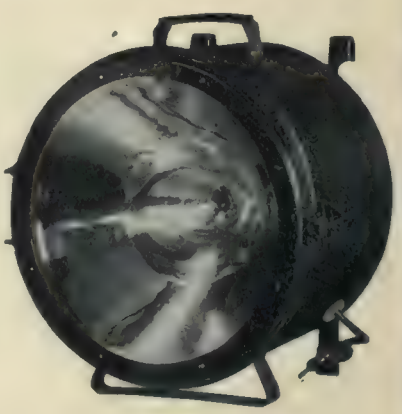
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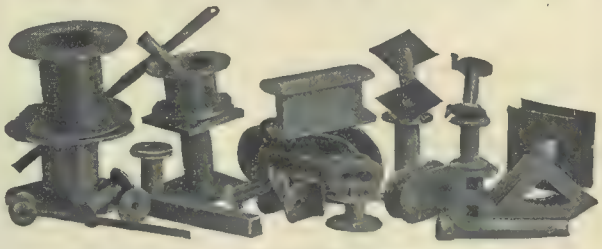
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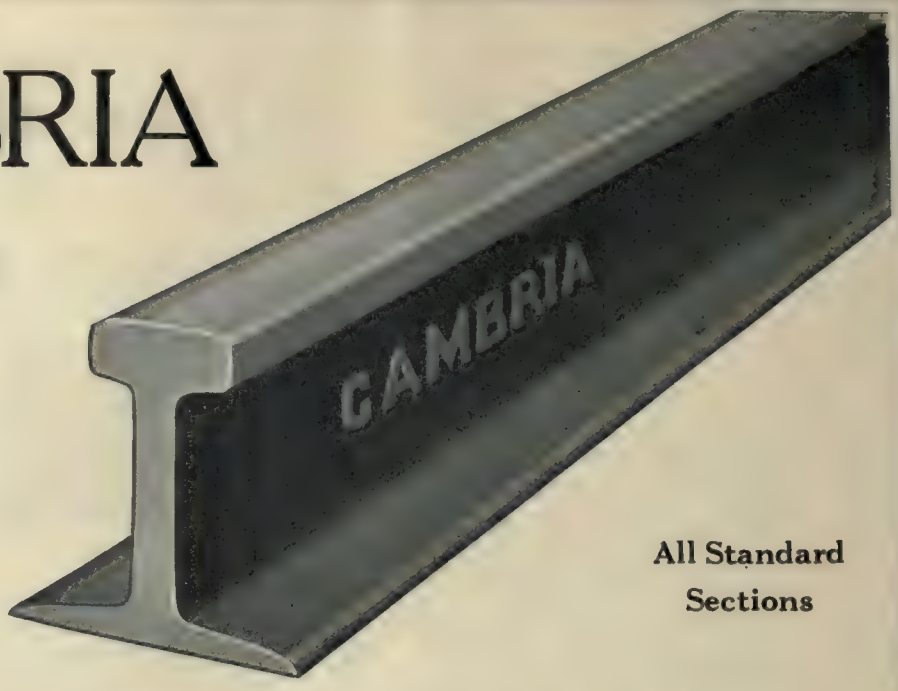
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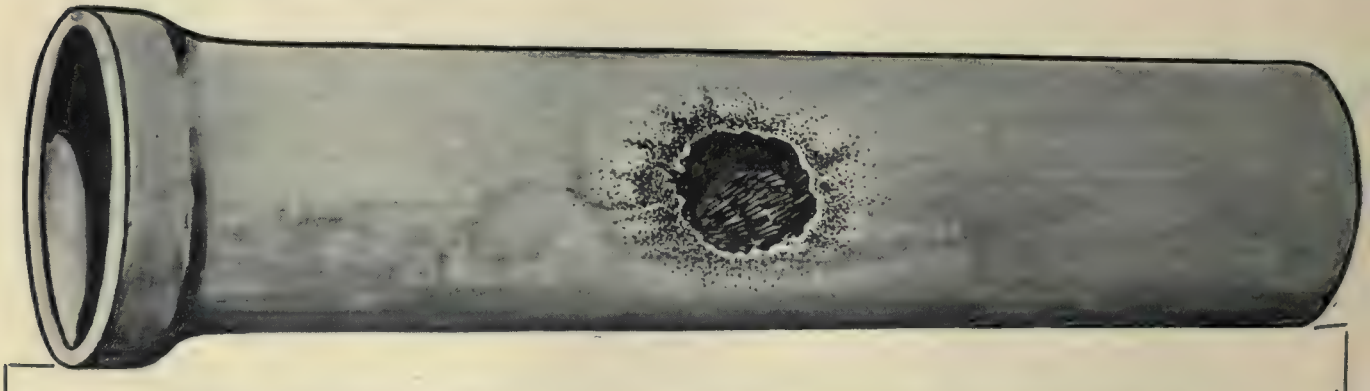


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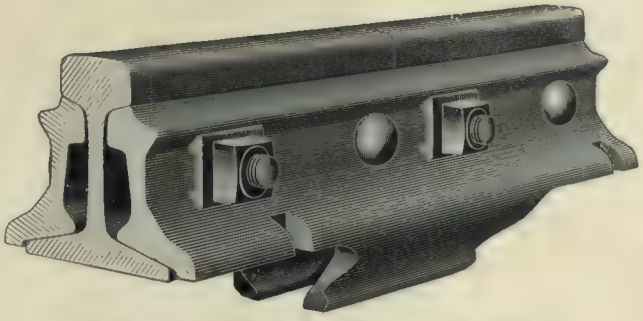
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7189

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200 Miles Track

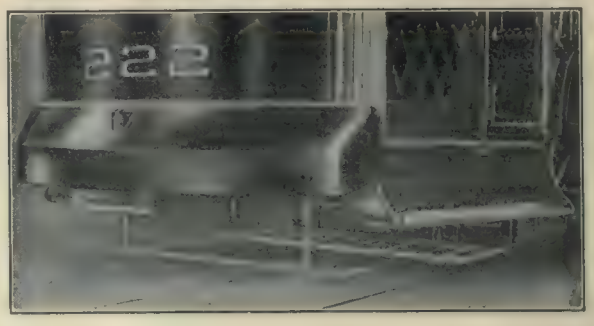


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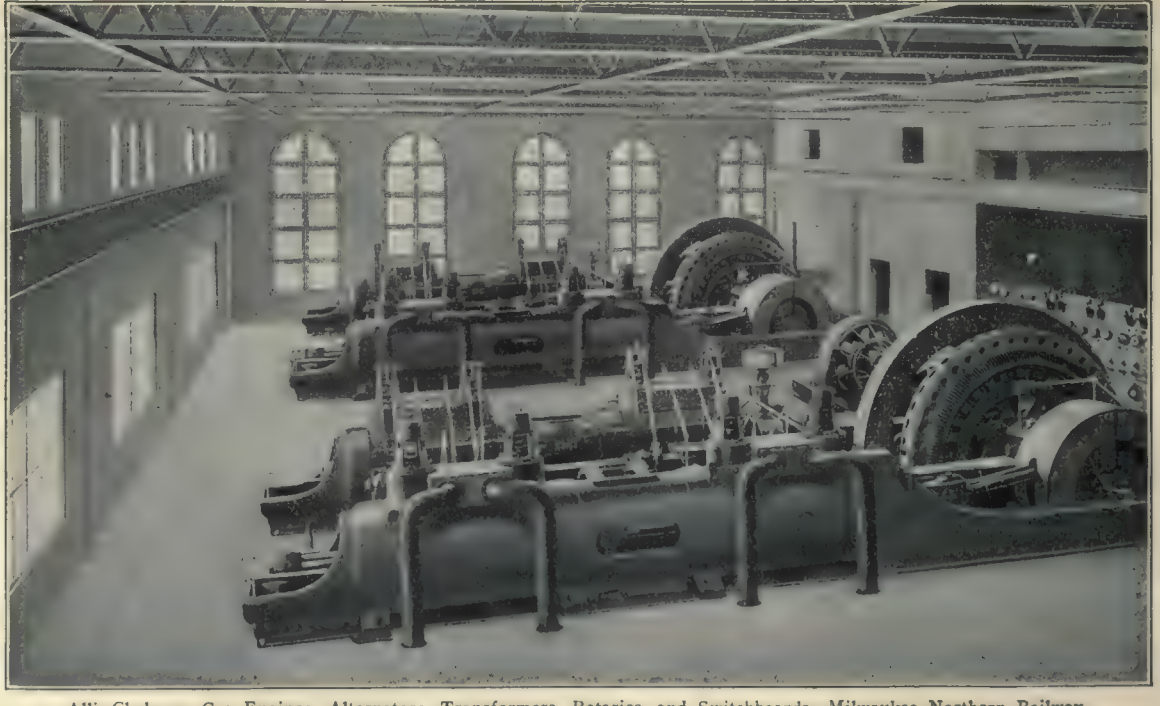
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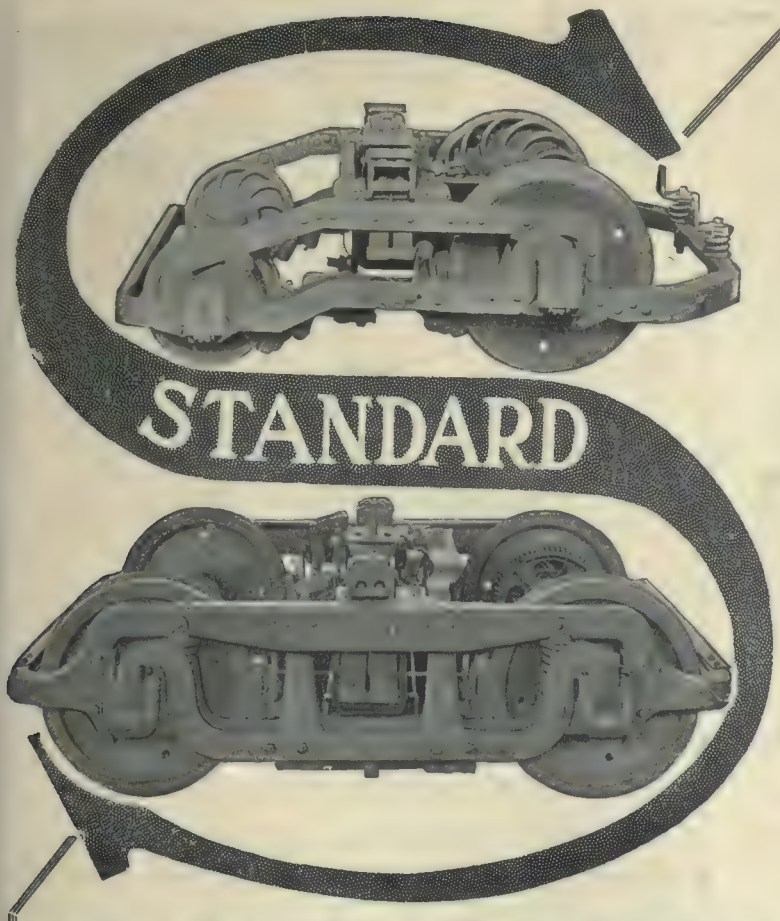
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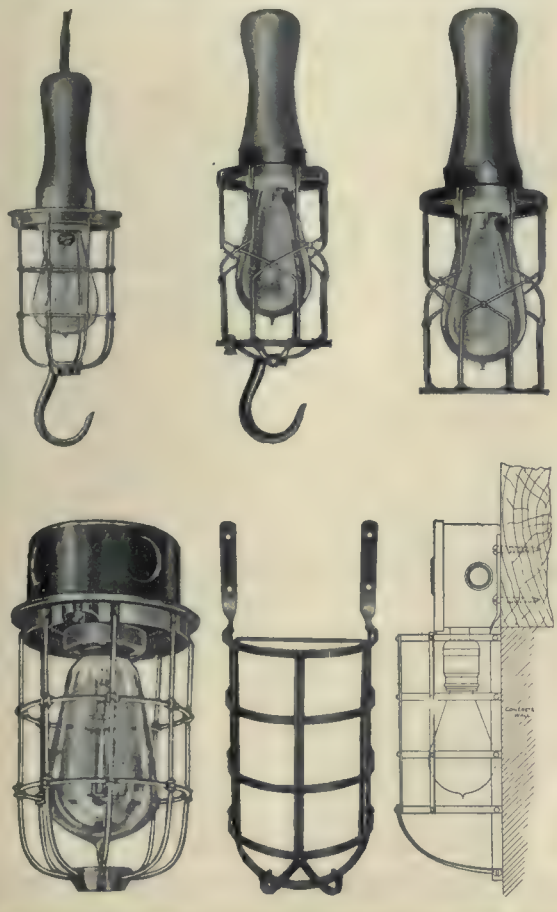
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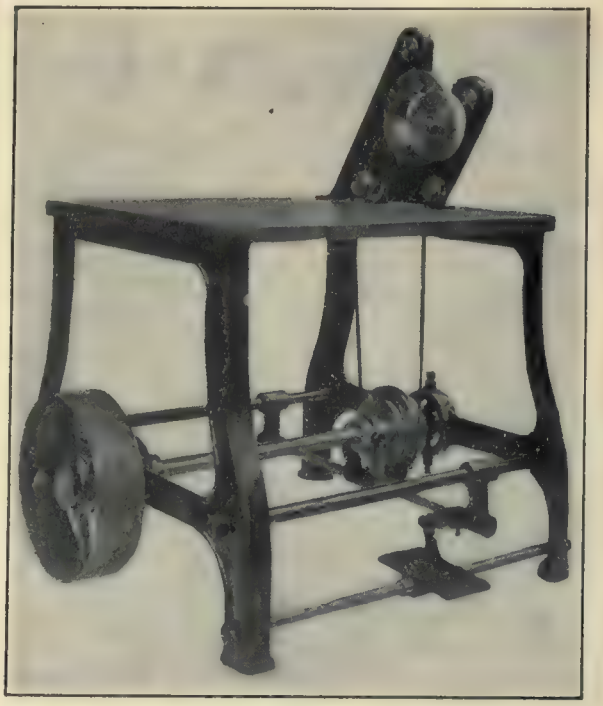
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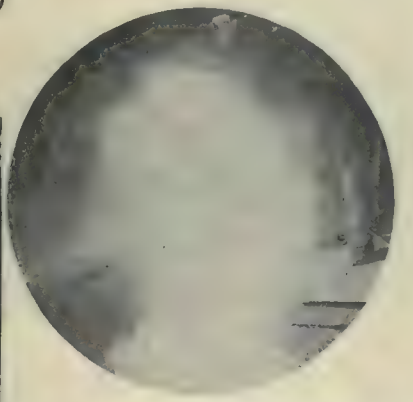
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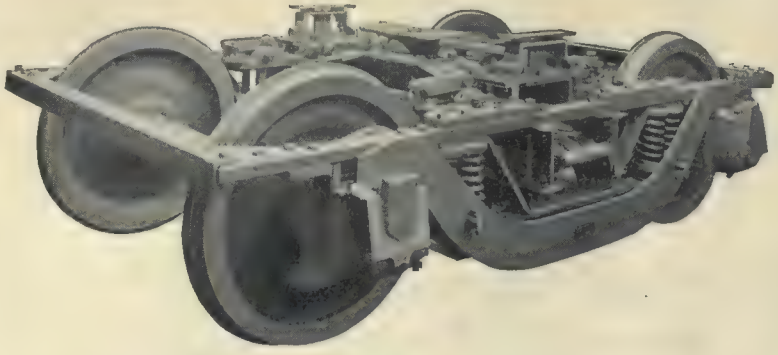
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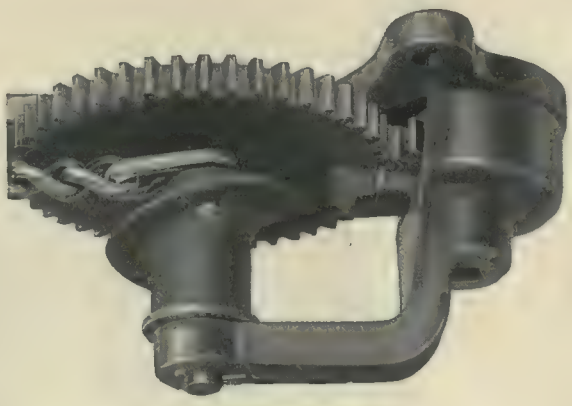
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5322

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY, FEBRUARY 27, 1915 No. 9

PROPOSED CHARGE FOR BAGGAGE

At the annual meeting of the Central Electric Railway Association, Mr. Laney, traffic manager Cleveland, Southwestern & Columbus Railway, called attention to the discrimination in fares involved when passengers are allowed to carry 150 lb. of baggage free if they desire. This practice has been followed on the electric roads largely because of its use on steam railroads, but it is illogical because it probably costs the railway company as much, if not more, to carry a trunk as to carry a passenger, yet it gets full fare for the one and nothing for the other. As is well known, the steam railroads abroad make a charge for baggage, and we believe that there is no reform which is more logical in the transportation business than this. Of course, a change in the steam railroad practice in the matter would help enormously. But, while it may not come for a long time, the tendency of the steam railroads, with the authority of the Interstate Commerce Commission, is to increase their passenger fares, and a charge for baggage by them would seem to be the natural sequence of this condition, especially if this particular change has been approved in principle by the Interstate Commerce Commission as stated by Mr. Laney.

METERS AND MEN

Without questioning the worth of car meters for furthering the correct and economical use of energy, a word of caution is due with regard to the use of meter records for comparisons of individual motormen in city service. The stumbling block in all such comparisons lies in the fact that the number of slowdowns and stops for a trip over a given route may vary extremely even for runs which are made during the same hour of successive week days. For example, on a dozen lines tested by one city company, variations of two to three stops per mile were common, and in one instance the stops, because of exceptional conditions, ranged from five to thirteen for almost similar loads. Therefore, it was no surprise that the energy used, as registered by car meters, showed from 120 to 180 watt-hours per ton-mile. Now it is evident that while interurban motormen can be safely checked on a ton-mile basis for like schedules and grades of equipment, motormen in most city services cannot, since the number of slowdowns and stops is beyond their control. The law of averages can be applied, and has been applied, where meters are in use, but this demands a detail study of conditions on the different lines in order to allow for all classes of equipment schedule and weather. Yet such a survey is a necessity if the company does not want to make the error of punishing the honest man who obeys all signals to stop and who coasts cautiously, while rewarding the dishonest man who skips stops and coasts recklessly. We repeat, therefore, that while meters should be of much value to a railway system as a whole, they should be used very conservatively as a gage for comparing the motormen until somebody invents a simple means for registering the number of stops included in each run and reading.

RELATION OF THEORY AND PRACTICE

In the debate on the subject of starting resistances for railway motors which has been going on in our columns for a few weeks past, one of the writers defends the use of analytical methods as far as they are applicable. This gives us the occasion for expressing an idea or two along the same line by way of explaining our attitude toward articles like those under discussion. In the first place calculation should be employed in place of "cut and try," whenever possible, because in general it is cheaper. This is obvious, but the rub comes in defining "whenever possible." No one who wants to design a cubical or cylindrical measure just large enough to contain a cubic foot or a bushel would apply the cut-and-try method. If the formula does not immediately come to mind recourse may be had to a hand book or text-book on mensuration. A simple sketch will help out the memory. The same principle should apply, whether the problem is one most easily solved by arithmetic or calculus. Again, an enormous amount of time is spent in most schools and colleges on mathematics, the whole purpose being to give the student facility in making calculations. For some reason, however, in the desire to be practical most students, after leaving school or college, fail to use their calculating ability and often resort to wasteful methods of accomplishing results. They "shy" at a technical article because it contains a little algebra or geometry. The same thing is true in the use of the so-called "higher mathematics," which is only a more highly-developed calculating device. The state of affairs described is partly due to the way in which mathematics has been taught, but nothing is to be gained for the present generation by criticizing the faults of early training. The thing to do is to overcome the results of those faults by practice in reading and interpreting equations. This can be done, if necessary, by putting them into the form of graphs. Further, the practical man should acquire a respect for theory, if he hasn't it already, for there can be no progress without it. Neither can there be any conflict between theory and practice. If there seems to be such, one or the other is false.

THE COMITY OF BUSINESS

That electric railway department heads are less mindful of the amenities of business life than men in other lines of business we will not admit. Nevertheless, incidents like the following tend to give, to those affected, the impression that in cases where friction has developed between a railway company and a manufacturer the former is not always as considerate as it might be.

The general manager of an electric interurban railway is reported to have requested a manufacturer some time ago to ship him certain material guaranteed to produce certain results within a year. The year elapsed, when, in answer to an inquiry from the manufacturer, the reply was that the material had not produced the guaranteed results, and, therefore, that payment was not in order. The salesman, however, refused to be convinced and personally visited the line, where, to his amazement, he discovered his material stored away and absolutely untouched since its arrival. The failure of another interurban railway to pay for goods shipped under contract blackened the reputation of traction managers in general in the same manufacturer's opinion and caused him in future dealings with electric railways to refuse the guarantee privileges previously offered. The dread of incurring heavy litigation expenses in enforcing payment made him unwilling to risk the guarantee chance except with steam roads, which in his words, were "either more honest as a class, or if dishonest, could afford to be dishonest only on a large scale."

Somewhat different in detail but involving the same general principle is the case where a city railway is said to have requested detailed prints of a repair-shop device from another manufacturer and to have told him later that the device was unsuited to the conditions existing in its shops. Subsequent investigation on his part showed the device to be in use there, having been manufactured in the company's shops without the permission of the owner of the original drawings.

In the minds of the manufacturers concerned in these three cases each represented deliberate, dishonest action on the part of the railway company concerned. We would be unwilling to agree to this without hearing the railways' side of the story, although we admit that if the allegations are true, each exhibits a careless disregard of business courtesy, if nothing worse. Where a company requests a service from a manufacturer or accepts a service from him, such as goods on consignment for trial, it is in duty bound within a reasonable time to report to him upon the general performance of these goods, irrespective of whether it desires to order any for regular use or not. As to the first case, the most charitable excuse which can be made for the statement that the material had proved unsatisfactory, although it had never been tested, is poor management.

This business obligation on the part of the railway company, however, does not relieve the manufacturer from a corresponding obligation, namely, to show proper diligence in following up the performance of his material when on trial. There is a legal maxim and a sound one that everyone should make reasonable efforts to protect himself if he expects consideration from others. This applies not only to business transactions where material is under test, as in the first and second examples mentioned, but also to the third case, where the manufacturer submitted detailed prints of a repair shop device. In this case the device may have been independently invented by one of the engineers of the company and, unless it had previously been patented by the manufacturer, he would have little legal redress. If it had been patented his duty was to bring suit promptly and press the suit to a conclusion, not only for his own benefit but for the benefit of other inventors.

The technical newspaper occupies a sort of "neutral" position between the manufacturing and operating sides of the field in which it circulates, and, like neutral countries during a war, it is often the recipient of complaints from one belligerent that the other is violating the rules of international law or else the more subtle regulations of the Hague tribunal. Like the neutral country the newspaper has the duty of pointing out the causes of friction. We do so in this case not primarily to show reprehensible practice on the part of the buyers or lax methods on the part of the seller but to assist to a better understanding between both. Where a case of seeming injustice occurs, the best way is for the person who considers himself injured to state his position clearly to the other but to lay no great stress on any supposed "rights" except those which can be enforced at law. On the other hand the buyer who recognizes only legal "rights" and ignores the reciprocal values of comity and fair dealing is a pretty poor buyer.

THE MODERN SINGLE-TRUCK CAR

Mr. Leonhauser's intensely practical article on "Reducing Maintenance Costs," published in our Equipment Department last week, suggests three different ways for attaining that end: First, better handling of the car equipment; second, co-operation with other departments, and, third, the use of single-truck cars. As the author himself has ably expatiated on the first two ways it is necessary to elaborate here only his comparison of the double-truck versus the single-truck car.

As an experienced maintenance man, Mr. Leonhauser advocates the single-truck car unreservedly for city service. His main reasons are not only its lower first cost ($64.30 as against $123.80 per seat, according to a comparison of some recent cars) but also because of the simplified maintenance which fewer parts assure. Since neither this lower first cost nor lower maintenance charge are disputed by any one, it is pertinent to ask: Why is the double-truck car? In the past the answer has been three-fold: Fewer physical limitations in negotiating curves; superior riding quality and, most important, greater capacity or less platform cost.

We believe, however, that the development of the radial axle truck has greatly cut down the superiority of the double-truck car along the three lines noted. With

the new truck the play of the axles is enough to take care of long cars on short curves, better-placed springs assure good riding at moderate city speeds, say 15 m.p.h., while the long wheelbase permits a carbody of appreciably larger capacity. The practicability of the radial axle single-truck car is clearly shown by the installation of the Third Avenue Railway System, New York. Since 1914 that company has been operating fifty such cars, each 35 ft. over all and seating forty-five passengers, chiefly in cross seats. Furthermore, these cars are of modern low-floor design, and they have produced excellent results in reduction of accidents and other operating costs.

While Mr. Loenhauser's figures are not based on the use of radial axle trucks, a car of the Third Avenue type should prove more economical for the car equipment department than any double-truck car of equivalent capacity. It is therefore incumbent upon the operating department to prove that the capacity of the biggest available double-truck car still exceeds that of the biggest single-truck car by so much that the platform savings of the first will offset the general savings of the second.

GRADE CROSSING ACCIDENTS

Many investigations have been made to determine the extent to which it is possible to influence the public to exercise care in crossing railway tracks. These indicate an appalling degree of heedlessness which can be reduced by systematic effort. It cannot be inferred, however, that every person who crosses a track without looking either way is unaware of the condition of the track, otherwise there would be many more deaths than there are. It must be remembered that the eyes are wide angle lenses and can take in a great deal without moving. They can be turned in their sockets through another wide angle without movement of the head. The ears, too, are invaluable aids to safety.

An interurban car, travelling at say 35 m.p.h. consumes about a second in passing a given point. If we assume that two cars pass the point in an hour there would be one chance in 1800 that a perfectly heedless person would run into a moving car. It happens also that, at ordinary walking speed, about one second is required to cross a single track, hence there is the same chance that a car would run into the individual. Obviously, the number of accidents, great as it is, is not great enough to indicate 100 per cent heedlessness in any considerable number of individuals. The fact is that there is some heedlessness in every person which is but crudely indicated by the lack of tangible precautions taken to insure safety.

The last report of the committee on grade crossings and trespassing on railroads of the Association of Railroad Commissioners directs attention to "that class (of our population) which seem to have little regard for law or custom and are a law unto themselves"; to the "increased use of motorcycles and automobiles in cities and villages by those having little regard for safety devices installed for their protection," and to the "driving of this same class of vehicles over grade crossings in the country where no protection has been installed and in many instances where the view of approaching trains is such that it would be a challenge to one's sanity to suggest that warning signals of any kind are necessary." All of which goes to emphasize the fact that, try as we may, we cannot make a grade crossing fool-proof. The eye, the ear, the sense of touch if necessary, and above all the common sense must be appealed to if crossing accidents are to be cut down.

THE RE-EXAMINATION

The ever-advancing standards in the car and signal equipment of high-speed interurban railways demand a parallel improvement in the trainmen. It is natural enough to make the new men show their fitness to handle the latest control and to respond to the indications of modern block signal systems but the manager is less inclined to set the same stringent standards for the veterans. The latter are willing enough to go to the schoolroom for lessons in the operation of new car equipment, but they fear to submit to an examination for heart action and color perception. In fact, the feeling against recurring physical examinations is so strong that it has often led to threats of a strike. Yet the management can do its duty to the riding public only by insisting that it is just as necessary to check men against deterioration as it is to check material. If an accident occurred the company would probably be penalized more severely for retaining a color-blind motorman than for using a defective axle, since the former often may be detected more readily than the latter. As no humane and sensible management would willingly dismiss a man who had proved able and worthy in the past it should be prepared to handle the delicate question of re-examinations along these lines: First, see that the re-examination is absolutely fair; second, place the retired man in a position of less responsibility but without decreasing the rate of pay.

The need of the first requirement is illustrated by a case where a motorman of seven years' unblemished service on a high speed line was rejected by the company physician because of a weak heart. Although pronounced sound later by a leading heart specialist, the discharged motorman could get no redress because the company permits no appeal from its doctor's decisions. There was more than a surmise in this case that the opinion of the company physician could have been revised with the aid of a $10 bill. As to the second requirement, it is clear that if the company had selected its men carefully in the past the number of deteriorated men would be much less and too few to affect the cost of less responsible labor appreciably. In any event the company is under a moral obligation to keep its faithful men at work and, if possible, at the old rates.

With these two just practices in force the management will find the older men far more willing to submit to physical examination from year to year, while the sense of fairness shown by the company will have a happy effect throughout the entire organization.

Signaling on the Illinois Traction System

A Description of the New Installations Made by the Company During the Past Year, Including Three Special Cases Where Complicated Track Arrangements Required the Use of Intermediate Signals Instead of Preliminaries, as Well as Individual Treatment in Locating the Signals

BY JOHN LEISENRING, SIGNAL ENGINEER ILLINOIS TRACTION SYSTEM

The Illinois Traction System has recently completed and put into service a new section of signaled territory covering a distance of 36.5 miles between Springfield and St. Louis. This completes this entire division of 99 miles, continuous signal protection being provided except for a 12-mile stretch between Staunton and Edwardsville, for which material is now on order. This installation follows the standard arrangement of signals that is generally used on the Illinois Traction System, a description of which was given in the ELECTRIC RAILWAY JOURNAL of May 16, 1914.

In addition to the above section, there have been installed three other sections in which marked departures from the customary arrangement have been necessary on account of local conditions. In these three cases the conditions differed enough, one from the other, to make each one a study in itself, and in none of them could the standard arrangement have been applied.



ILLINOIS TRACTION SIGNALS—SIGNALS AT SOUTH END OF PEORIA BRIDGE



ILLINOIS TRACTION SIGNALS—SIGNALS AT EAST PEORIA WHERE CITY AND INTERURBAN TRACKS CONNECT

PROTECTING PEORIA BRIDGE

Of the three, perhaps the most interesting one was that made near Peoria, where it was desired to protect operation on a single track bridge over the Illinois River. This bridge extends from Peoria to East Peoria and is used jointly by the cars of the Illinois Traction System and the Peoria City Railway. Fifty regular interurban trains cross this bridge in twenty-four hours, the majority of these movements being made between 5 a. m. and 12.30 a.m. In addition to the passenger trains, all freight and power-house coal entering Peoria over the system must use this bridge, and as a classification yard is located on the East Peoria side of the river a large number of switching movements also are necessary. The city service operates on a ten-minute schedule during the morning and evening, this headway being changed to twenty minutes in the off-peak hours.

The bridge, including approaches, is approximately 1600 ft. long and is made up of four through-truss spans, four through-girder spans, six deck-girder spans and one double-leaf, lift span, 141 ft. long, that extends over the river channel. As an added complication to the use of track circuits, there is a 50-ft. section of track, near the Peoria end of the bridge, in which the rails are attached directly to longitudinal steel girders, no cross-ties being used. The purpose of this is to allow coal to be dumped during the night from hopper-bottom coal cars into a pit below the bridge superstructure. From this the coal is conveyed into the power house as needed. It was out of the question to insulate one rail from the other across this section, and the length was sufficient to allow a car to come wholly within its limits. Therefore, special arrangements of circuits had to be used so that the signals would not clear while a car was standing on the dead section.

The diagram on page 409 shows a general layout of the tracks adjacent to the bridge, and from this it will be noticed that the double-end siding of Farm Creek, the entrance to the classification and carload delivery yard, and the turn-outs at the point where the city cars diverge, are all within signaled territory and had to be protected. The new section of signals shown in the diagram immediately adjoins a section that had been previously signaled, signal 1713 being part of the installation from East Peoria to Mackinaw Junction that was made about three years ago.

In order that following movements could be made with as little delay as possible, it was decided to divide the section into two blocks for following movements, but to maintain a single block for opposing movements, as it

was impossible to use the Farm Creek Siding for meeting or passing trains, because this siding is intended for freight service only. It was also decided that no permissive movements should be allowed and that the signaled section must be self-contained and must not overlap or extend into the territory beyond signal 1713. This, of course, made it impossible to have a preliminary section at the south end of the block without leaving an unprotected piece of track between signals 1713 and 1710. It was also impossible to install a preliminary at the Peoria end, on account of the numerous switches and paved streets. Therefore, it seemed practically necessary to adopt the scheme of using auxiliary home signals instead of a preliminary section.

All signals installed in the new section are of the semaphore type except those used to control the movement of the city cars on the main track. With the arrangement as installed the operation is as follows: A south-bound train, passing signal 1723, will set signals 1720, 1712, 1710, 1710-A and 1710-B in stop position. If an opposing train passes either semaphore signal 1710 or the light signals 1710-A or 1710-B at the same instant that the south-bound train passes signal 1723, signal 1712 will stop the north-bound train and the south-bound movement can continue as far as signal 1721. Orders are in effect that any train which finds signal 1712 against it, after passing signal 1710 at proceed, must back up at once beyond signal 1710, so that the opposing train may proceed without delay at signal 1721. When the south-bound train passes signal 1712, signal 1723 will clear and a second train may follow into the section.

A north-bound train passing any one of the signals 1710, 1710-A or 1710-B sets signals 1723 and 1721, as well as the signals behind it. All three signals at Farm Creek clear after this train passes signal 1720. The switch indicators at Farm Creek Siding have been controlled only to the point marked "1" on the diagram, and to signals 1710, 1710-A and 1710-B, as it was considered to be desirable to reduce the control section to the minimum safe distance. This decision was made because of the cutting down of the time available for switching work on account of the frequent service.

In the illustration on page 408 is shown the double signal location at the south end of the bridge. These signals are mounted on the bridge pier considerably below the track level. The wires leaving the trunking and attached to the bridge structure would normally be carried over the bridge in trunking laid next to the wooden guard rail, but on account of redecking work these had to be temporarily removed. The right-hand illustration shows signals 1710, 1713 and 1712, also the turnouts used on the Peoria cars.

This installation cost approximately $6,000. It replaces an installation of trolley-contact signals which did not give complete satisfaction under the peculiar conditions involved.



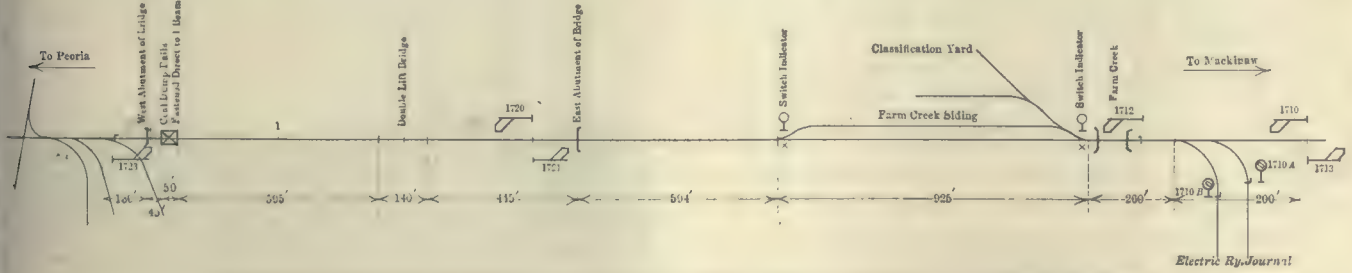
ILLINOIS TRACTION SIGNALS—VIEW OF SIGNALS AT TORRENCE SIDING ON THE DECATUR BELT LINE

LIGHT SIGNALS WITH SELF-CONTAINED BLOCKS

The two other special installations that were made last year are of the light signals only, one being on the freight belt-line around the city of Decatur and the other protecting a single-track bridge on a suburban line that runs south from Danville to Ridge Farm.

The general layout of the Decatur Belt installation is shown in the accompanying diagram. There are seventeen signals of the Union Switch & Signal Company's light type with 5⅜-in. lenses, and these protect four blocks which vary in length from 1700 ft. to 7100 ft. Each block has a single-track circuit, and auxiliary signals in advance of those at the ends of the blocks are used. This scheme was adopted partly because it eliminated the necessity for a preliminary section, which was not considered desirable under the conditions encountered, and partly because it could be installed at much less expense than the standard arrangement used on the main line.

The traffic controlled by these signals is of the most widely different class imaginable, a light single-truck city car being one extreme and the heavy interurban freight trains being the other. The freight trains often exceed twenty cars, of which a part, at least, are of 100,000-lb. capacity. Trains are quite infrequent when



ILLINOIS TRACTION SIGNALS—LAYOUT OF NEW SIGNAL SECTION AT PEORIA BRIDGE



ILLINOIS TRACTION SIGNALS—LAYOUT OF NEW SIGNAL SECTION FOR DECATUR BELT LINE



ILLINOIS TRACTION SIGNALS—APPROACH TO BRIDGE OVER VERMILION RIVER AT DANVILLE

compared with the number at Peoria, the city cars operating in each direction from Marietta wye every half hour. The freight service varies according to traffic requirements and is confined to the early morning and after-dark hours.

The operations in all blocks are similar. When a train enters a block, as at signal D-380, the opposing signals D-383 and D-385 display stop indications. Signal D-382 continues to give a proceed indication until the train passes it, when the indication changes to "stop." This is accomplished by the use of center-fed track circuits with proper voltage adjustment and proper location of the auxiliary signals in relation to the transformer and relay locations. The intermediate or auxiliary-home signals are used to indicate to a motorman that no opposing train has entered the block at the same instant as his own train, which is possible because there are no preliminary sections. If such a thing does happen, both trains will receive stop indications at the auxiliary-home signals which in the block in question are D-382 and D-383.

All turn-outs at which high signals are not installed are protected by switch indicators that are controlled in each direction to the ends of the block in which the siding is located. The connection to the Wabash Railroad that is shown in the diagram is one over which all carload shipments are received from and delivered to that railroad.

It should be noticed from the general layout that several of the track circuits are very short—so short, in fact, that in the design considerable doubt existed as to the possibility of working out the center-fed track circuits satisfactorily. Consequently, thorough tests were made, and special relays were used where necessary, the galvanometer type being installed in Sections B and D and the vane type in Sections A and C. Section C is the shortest circuit ever worked on the center-fed principle, but it has given perfect satisfaction in every way.

On page 409 is a view looking east in Section B, signals D-380 and D-381 being seen in the foreground and signals D-382 and D-384 in the distance. The signal transmission line is just above the trolley span wires. This is a 2300-volt, twenty-five-cycle, single-phase circuit having one source of supply at the Decatur power house and another at the Harrison substation. In both of these plants, step-up transformers are used for stepping up the 370-volt current supplied for the rotaries to 2300 volts. The low-tension, signal-control wires are carried on the alley arm opposite the d.c. feeder wire.

At Danville there is installed one block of the same arrangement of signals as described above. They protect a single-track bridge over a deep valley and the Vermillion River. Double track approaches lead to the bridge on both sides, and at one end of the bridge track circuits are carried for a considerable distance through the paved street. The bridge itself is 1700 ft. long, the section of track circuit in pavement 380 ft. long, and the entire block, from end to end, 2160 ft.

The end of the block in pavement is shown in one of the accompanying illustrations. The signal that appears in the middle distance is the auxiliary-home signal, as the block section extends several hundred feet back of the camera. The signal transmission line for this block is carried on a line of poles extending along the right-of-way beside the bridge, while the low-tension control wires are run in trunking laid alongside of the wooden guard rail on the bridge floor.

All of the installations described above were made during the summer of 1914, the company doing all the work with its own forces, the material having been purchased from the Union Switch & Signal Company.



ILLINOIS TRACTION SIGNALS—INTERMEDIATE SIGNALS ON DANVILLE BRIDGE

Annual Convention of C. E. R. A.

Letter from Governor of Indiana, and Addresses by Chairman of Public Service Commission, Mayor of Indianapolis, and Prominent Representatives of American Association Part of First Day's Proceedings—Paper on Baggage and Report on Standard Charges for Repairs on Foreign Equipment Also Presented

The spirit of helpfulness expressed in Governor Ralston's letter to the members of the Central Electric Railway Association assembled in its annual meeting at the Hotel Severin, Indianapolis, Ind., Feb. 25 and 26, was unquestionably the most pleasing part of the regular program. The encouragement also gained from the address of Chairman Thomas Duncan of the Public Service Commission of Indiana was significant of a change in public sentiment toward electric railways which should aid their future welfare.

The Governor stated that it was his intention to recommend to the legislature that it empower the Public Service Commission of Indiana to authorize an increase in passenger fares in the state to 2½ cents per mile. Chairman Duncan of the commission expressed himself as in sympathy with the proposed recommendations of the Governor. This same spirit of good will toward the electric railways of Indianapolis was expressed by Joseph E. Bell, mayor of Indianapolis.

More than 120 members of the association attended the meeting which was opened on Thursday morning, with President Schneider in the chair, with address of welcome by Mayor Bell of Indianapolis.

The mayor stated that it was a most regrettable condition when the railway managers must stand on guard each time the state legislature was in session, to prevent the confiscation of their property. He expressed himself as in hearty accord with the interests of the men who take care of the pay rolls. The open spirit of hostility on the part of the public through its regulative bodies toward the transportation companies has produced the great army of unemployed, in the opinion of the mayor. A few weeks or months of cessation of this hostility will solve the unemployment problem. In closing Mayor Bell stated that he believed it his duty to guard the business interests, and in so doing he hoped to see new electric railways constructed. He said they had done much for the state and were invaluable to Indianapolis.

Standard Repair Charges for Foreign Equipment

In the business session which followed, President Schneider announced that the first order of business was the report of the standards committee. R. N. Hemming, chairman of the committee, reported that this committee had under consideration the question of uniform charges for repairs to foreign equipment. At the last committee meeting S. W. Greenland, Fort Wayne & Northern Indiana Traction Company, had submitted a tentative form of report and emphasized the necessity of further and more detailed consideration of this subject. It was the concensus of opinion of the committee that the report should cover the conditions in a definite and comprehensive manner, not only as regards the subject specifically but as regards responsibility in case of damage to equipment. The committee recommended that the subject should be continued, and to this suggestion the association voted to give its approval.

Charge for Baggage

President Schneider then announced that the next subject on the program would be the paper by Charles J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway, entitled "Is Handling of Free Baggage a Traffic Error." This paper is published in abstract on another page of this issue.

The discussion of Mr. Laney's paper was opened by F. D. Norviel, general passenger and freight agent Union Traction Company of Indiana. Mr. Norviel took issue with the author regarding traffic errors of the past. He stated that low fares were necessary to create the business. Since then traffic had developed to a point where the character of service permitted an increase in rates without decreasing the business. Mr. Norviel doubted the advisability of charging for all baggage handled until the steam roads had set the example. If a baggage rate was applied at this time he felt quite certain that it would result in a loss of long haul business.

J. F. Starkey, general passenger agent Lake Shore Electric Railway, concurred in the suggestion made in Mr. Laney's paper. He believed that the traveling salesmen did not use the electric road because it was cheaper but because they could make more calls in a given time. Mr. Starkey also stated that he did not believe electric roads, so far as their passenger traffic was concerned, should consider the steam roads as serious competitors. It was the service that got and held the business.

F. I. Hardy, superintendent of transportation Chicago, South Bend & Northern Indiana Railway, recalled a case where a steam road had reduced rates and increased its service to meet electric railway competition, but it could not obtain any more business than at the old rate. Mr. Hardy also stated that he had found that the method of collecting 25 cents for each piece of baggage checked returned about the same revenue as that of carrying 150 lb. of baggage free and charging for excess baggage. He believed that it would be better policy to await similar action by the steam roads before charging a uniform rate for baggage.

R. A. Crume, general manager Dayton & Troy Electric Railway, believed that while a uniform charge for baggage might result in the loss of some business, it would enable his company to utilize to better advantage the 20 per cent of its car floor space which was now devoted to the transportation of baggage. Although his road charges more fare than its steam road competitors, it has never felt the competition. It was Mr. Crume's opinion that there would not be an appreciable loss in business if a uniform charge for all checked baggage was applied by electric roads.

Addresses by Commissioner Duncan and Representatives of American Association

President Schneider then announced that C. Loomis Allen, president American Electric Railway Association and president Newport News & Hampton Railway, Gas & Electric Company, had expected to be present at the meeting and deliver an address but was detained by illness. Mr. Allen has just undergone an operation on his throat. In his absence, Matthew C. Brush, second vice-president Boston Elevated Railway and president American Electric Railway Transportation & Traffic Association read a paper for him.

At the Thursday afternoon session, a letter addressed to the association from Governor Ralston was read by Charles L. Henry, Indianapolis & Cincinnati Traction Company. This was followed by an address by Thomas Duncan, chairman of the Public Service Commission of Indiana.

Continuing the regular program, C. C. Peirce, Boston, vice-president American Electric Railway Manufacturers' Association, addressed the meeting. He was followed by E. B. Burritt, secretary of the American Electric Railway Association. Mr. Burritt emphasized the good that could come from closer relations between the local associations and the parent association. At the conclusion of Mr. Burritt's address a vote of thanks was tendered the eastern representatives of the American Associations who had addressed the association. A congratulatory telegram was sent to C. Loomis Allen for having successfully passed through his operation and the association wished him "God Speed" toward complete recovery.

Friday's Session

At the session on Friday the report of A. L. Neereamer, secretary and treasurer of the association, was presented. An abstract of this report is published on page 413. A full report of the session on Friday and the trip taken in the afternoon to the plant of the Prest-O-Lite Company and to the Speedway will be published next week.

Central Electric Railway Traffic Association

The meeting of the Central Electric Railway Traffic Association as usual preceded the meeting of the Central Electric Railway Association, being held on Feb. 24. The report of A. L. Neereamer, chairman of this association, will appear in next week's issue.

IS THE HANDLING OF FREE BAGGAGE A TRAFFIC ERROR?

BY CHARLES J. LANEY, TRAFFIC MANAGER, CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY

There is quite a difference of opinion among railway men whether there should not be a charge for handling baggage.

In discussing the recent 5 per cent freight rate increase, the Interstate Commerce Commission remarked that the railroads had overlooked a valuable earning power of its passenger departments in its handling of baggage. We are now in a general business depression and the 5 per cent rate increase does not as a whole materially affect our member companies. No interurban has yet a freight earning power as great as its passenger, and a depression in the passenger earnings disturbs the whole organization. Therefore, we must analyze the situation and find the errors of the traffic conditions.

We devote about 20 per cent of our trains to the transportation of baggage, most of which is carried free under our tariffs. We go to more trouble and expense to accommodate a passenger with a piece of free baggage, from whom we collect $1 in fare, than we do for two passengers without baggage traveling the same distance and from whom we collect $2 in fare. In the words of the railroad commissions, is that not a discrimination?

As an answer to this, you will say that we must carry free baggage in order to compete with the steam roads. Service has been the factor in making the interurban roads popular in our country to-day, and by this service traveling men have been able to visit two and three towns a day instead of one by the steam road way. Do you think that now that this service has been established this reasonable charge for baggage would tend to drive it back to the steam roads? I do not. We are operating at a loss when we carry a passenger and 150 lb. of baggage free at one fare, and why should we not change such conditions? If a reasonable charge was made for all baggage and the baggage was handled in a manner satisfactory to our patrons, such a service would have a tendency to increase the traffic and thereby create a profit, rather than the present method of carrying baggage free because some one else does it.

Being in the traffic end of the business, I realize that we are apt to hesitate in making any recommendations that would have a tendency to disturb the custom of our department or to eliminate one of our talking points, that of giving something for nothing. But we must be more progressive. We must present to the public a fair return for their investment in our service and, at the same time, not lose sight of the fact that our companies expect a fair return for their investments.

Some states make it compulsory for railroads to handle baggage free. This is a demoralizing condition. Any state that makes it compulsory for railroads to handle 150 lb. of baggage free for any distance on a 2 cent per mile maximum rate of fare is unreasonable in its demands on the railroads and discriminatory among its people.

The Interstate Commerce Commission is quoted as saying, during a recent hearing, that not a single railroad was able to present the actual cost of handling baggage. Such is the case with the interurbans. I have had letters from several of the large electric lines in reply to my inquiry for certain baggage data, but not one of these roads was able to give me the number of its baggage-carrying passengers or the average weight of baggage per passenger. But we all know this: We are handling more baggage every year. We are devoting 20 per cent of the space in our trains to baggage, which could be used at a profit if charging for baggage, or this space could be used for passengers. We are compelled to establish baggage agents and erect baggage rooms in most of our towns and also to pay misrepresented claims for baggage. We have to issue free baggage checks and establish a system of baggage records with no financial returns. When you figure up the cost, you will find that the baggage-carrying passengers do not represent a profit.

For an average month our road handled 2000 pieces of free baggage, and we only check free where the fare is 25 cents or more. If we count one piece of baggage per passenger, this is about 5 per cent of the total passengers carried on a fare of 25 cents or more; not a very large ratio, but a very strong argument in favor of charging for baggage. If we charged for baggage and should lose 50 per cent of the baggage carrying passengers, the 50 per cent that did pay would offset the other. But we should not lose 50 per cent by reason of such charge. I am safe in saying that 5 per cent would be a large allowance.

Now a word about baggage claims. When a piece of baggage is lost or stolen while in our possession it is wonderful how valuable the contents of a trunk are. Then, delay claims are continually coming to us, although we do not agree to transport a passenger and his baggage on the same train, nor do we agree to get his baggage to destination at a certain time.

The class of persons who are most strenuously fighting the proposed advance in passenger fares are the traveling men. These men get the benefit of less than 2 cents per mile on account of their free baggage and travel on mileage books, and 90 per cent of their transportation is not paid by them personally, yet they are a mighty factor in influencing our legislation. The saving to the traveller over the charge made by the

express companies is not great, perhaps 25 cents, for which he has the bother of checking. Would it not be better for us to equalize this charge and get a revenue for all baggage handled?

We must get away from the notion that the only way to get business is to cut the rate and revenue. We have been guilty as electric lines in the past in making ourselves believe that we can transport passengers cheaper than the steam roads. We have created business that did not exist and cannot be maintained by the steam roads, yet we have been contented to adopt their methods in handling baggage and force ourselves to believe it is remunerative. If we continue to do this, when depression in business comes, we must cut our service, the only stock we have in trade, to make both ends meet. This would invite public criticism, which always results in more drastic legislation against us. Let us realize before it is too late that the handling of free baggage is a traffic error.

ANNUAL REPORT OF SECRETARY-TREASURER OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

BY A. L. NEEREAMER

During the year ending Dec. 31, 1914, the association held three meetings as follows: Feb. 26 and 27, Cleveland, Ohio; June 25 and 26, Toledo, Ohio; Nov. 19 and 20, Fort Wayne, Ind. All of these meetings were very well attended, showing increased interest in the association.

The interurban membership of this association, as shown in the last annual report, was fifty-eight lines, covering 3859 miles. The membership on Dec. 31, 1914, covers sixty-six interurban lines aggregating 4166 miles, with two city lines. This is an increase of eight interurban lines, two city lines and 307 miles of interurban mileage. During the year 1913 we had 121 supply members and for the year just ended 125, an increase of four.

RECEIPTS AND DISBURSEMENTS, JAN. 1 TO DEC. 31, 1914

Cash on hand Jan. 1, 1914	$1,871.99	
Interurban lines	4,064.45	
City lines	158.33	
Supply men	1,000.00	
Sale of buttons	16.00	
Stationery and printing	1,908.18	
Central Electric Ry. Accts. Assn	26.00	
Supply men's special fund	174.40	
Miscellaneous	5.35	
Interest	57.37	
Payroll		$3,287.30
Traveling expenses		202.35
Stationery and printing		1,827.33
Postage		175.00
Telephone and telegraph		70.15
Office incidentals		10.50
Taxes and insurance		6.65
Freight and express		52.18
Office fixtures		14.00
Office rent		504.00
Legal expense		20.90
C. E. R. A. A.		309.75
Checking account		729.88
Saving account		1,895.36
Supply men's special fund		176.72
	$9,282.07	$9,282.07

You will note from this report that there is a deposit of $2741.54, of which $1895.36 is invested in the Fletcher Savings & Trust Company drawing 3 per cent interest, and $176.72 belongs to the supply men department. This sum was placed in the hands of your treasurer as trustee.

Your attention is called to the following statement of accounts receivable and payable:

ACCOUNTS RECEIVABLE AND PAYABLE DEC. 31, 1914

Cash on deposit	$2,801.96	
Due from members	116.30	
Accounts payable		$0,000.00
Supply men's special fund		176.72
Cash on deposit		2,741.54
	$2,918.26	$2,918.26

During the past year every effort was made by your secretary, with the assistance of the officers of the association, to increase the membership, and the results given in the first part of this report show that this effort met with some success.

There are still in the territory, especially in Ohio, Illinois and Michigan, a number of lines that should affiliate with this association, and your secretary is of the opinion that if a concerted effort was made and the benefits of the association placed before these lines, that part of them at least would be glad to join in our work.

No printed report of the standards adopted was distributed this year for the reason that the reports already issued needed revision and being brought up to date. This is now in the hands of the standardization committee, being edited, and when this work is completed it will be issued in loose leaf form.

In closing, your secretary desires to extend to the officers, committees and members of your association his thanks and hearty appreciation for the valuable assistance and support given him during the past year.

Engineering Features of Proposed Cincinnati Rapid Transit Line

The printed report on the proposed rapid transit railway and interurban railway terminal for the city of Cincinnati by F. B. Edwards and Ward Baldwin, transmitted to Mayor Spiegel by F. N. Kruge, chief engineer of the city, has just been published. An outline of the plan was published on page 108 of the ELECTRIC RAILWAY JOURNAL for Jan. 9, 1915. A letter discussing the report from George F. Swain on the plan is also included. The report occupies some ninety-six pages and contains drawings of the elevated structure, subways, stations, track, cars, etc., proposed, as well as detailed estimates of cost, charts of current consumption for typical runs, schedules, etc.

The car suggested is similar in general design to the latest type of car on the Boston Elevated Railway as well as the kind recently adopted by the New York Municipal Railway Corporation. It contains three side doors and is 70 ft. long by 10 ft. wide. There are no vestibules. A standard gage of track is recommended. Certain of the interurban railways entering Cincinnati are equipped with a gage of 5 ft. 2½ in. The report considers the relative cost of laying an additional rail in the proposed belt line to care for these cars and also the cost of changing these interurban lines to standard gage. The figures are respectively $150,000 and $112,000, so that the change of the interurban lines to standard gage is recommended. In this conclusion Professor Swain coincides.

An American consular officer in Norway reports to the Bureau of Foreign and Domestic Commerce, Department of Commerce, at Washington, that a firm in his district is inviting bids for the construction of an electric mountain railway. When these plans and specifications arrive they may be examined at the Bureau of Foreign and Domestic Commerce.

A dispatch from Berlin announces that the management of the municipal street railway system there has forbidden the knitting of stockings by passengers while sitting in the cars. Conductors have been furnished with copies of the solemn "ukase" which requires them to ask women engaged in this occupation to stop it or "kindly step outside." The reason given by the street car management is that there is considerable danger of passengers falling into the needles.

The Cost of Bus Operation

Figures Based on Actual Results Are Published Both for Auto Buses and Jitneys, as Well as Estimates of Cost Made by Representatives of Projected Bus Companies

The fact that the jitney bus has succeeded in operating at all with a 5-cent fare has, apparently, obscured one of the points that is vital to its ultimate success, namely, its real cost of operation. The idea has gone forth broadcast that the auto bus (if not the small jitney) can compete directly with the street car and that, in consequence, it will eventually displace the latter in urban transportation. This viewpoint was voiced by the Hon. A. W. Lafferty of Oregon in Congress on Feb. 10 in part as follows:

"Mr. Speaker, recently a young man in Oakland, Cal., owning an old automobile, and being without money or patronage, conceived the idea of competing with the electric street cars. This was a new idea to the young man and was born of his necessity, but it was not in fact new. For over ten years more passengers have been carried through the streets of London by the buses than have been carried by the trolley lines. The service is just as regular and just as cheap. And what happened in London when it was demonstrated that the motor bus was going to become more popular than the trolley car? The capitalists, owning surface trolley lines, promptly unloaded them on the city and got the city council to grant to them exclusive franchises to operate the motor-bus lines as a private corporation.

"It is amusing to watch the newspaper representatives of the capitalists in our Western cities fight the 'jitney bus.' They say the electric car line 'has helped to build up our beautiful city and is entitled to our patronage.' One Portland paper even claims that the street car company was responsible for paving a street to a suburb. Just at the present, when the jitney bus is owned by Tom, Dick and Harry, it is a bad thing and ought to be frowned on, according to these newspapers. But you just wait till the jitney bus grows to formidable proportions and becomes a dangerous competitor of the trolley lines, and then you will see these same newspapers favoring 'regulation' of the jitney bus. And in order to regulate it to the satisfaction of the money power these papers will favor granting an exclusive franchise to one big corporation to handle all the motor bus business of the city. They will say that we should have the latest and largest and most improved motor buses and that the interests of the service demand that the matter be placed in the hands of one company with 'sufficient capital' to handle the situation.

"When that time comes, these same corporation-controlled newspapers will favor unloading the surface lines onto the city and at such prices as to let the capitalists out at a big profit from a losing proposition. What every city should do is to own its own transportation facilities. These facilities constitute a monopoly, and if the cities owned them they could make a splendid profit, employ men at fair wages, and furnish every part of each city with good service. The latest and best vehicles could be adopted as fast as their practicability were established."





JITNEY BUS—VIEWS OF SEMI-CONVERTIBLE STORAGE-BATTERY BUS PROPOSED FOR NEW YORK

Cost of Auto Bus Operation

In view of the remarkable amount of misinformation contained in the congressman's remarks it is interesting to consider the actual cost of motor bus operation as set forth in the *Commercial Vehicle*, the representative paper of the motor truck industry. In December, 1914, there was published a list of nineteen companies using auto trucks in passenger service of which seven operated in cities, six on suburban runs, and six in interurban service. The average bus capacity was twenty passengers, and the average daily mileage 91, or 33,200 miles per year. The average costs in cents per bus mile for the charges mentioned were as follows:

Tires	6.74 cents per bus mile
Gasoline at 18 cents per gal.	4.0 cents per bus mile
Oil and grease	0.64 cents per bus mile
Repairs	1.92 cents per bus mile
Wages of chauffeur	3.36 cents per bus mile

A figure of $25 per bus per year for insurance was also given, but this was admitted to be low as a number of the companies did not insure, the proper figure being between $60 and $90. No housing or garage charges were included, these ranging from $100 per bus per year in country towns to $600 in the largest cities. The average truck was estimated to have cost $3000 and to weigh 7500 lb., and at the time to which the figures applied the average truck had an age of about two years. This comparatively short period of service would tend to reduce the repair cost, as given, below that which might be expected as a normal average, but opposed to this is the fact that nearly every one of the nineteen companies in question operated only a small fleet of buses.

As the expenses shown above constitute only part of the true operating cost estimated additional charges are appended:

Assuming a life of five years and a depreciation of 20 per cent, or $600, a housing charge of $300, an insurance charge of $70 and an interest charge of 6 per cent, or $180, there is an overhead charge of $1150 on each bus or 3.46 cents per mile. Also, assuming taxes, general expenses and damages to constitute the same per-

centage of operating expenses that they do in electric railway service, there should be added respective charges per bus mile of 2.2 cents, 1.2 cents and 1.3 cents. Summarizing all of these costs would give the following operating expense for a twenty-passenger bus:

Tires	6.74	cents per	bus mile
Gasoline	4.0	cents per	bus mile
Oil and grease	0.64	cents per	bus mile
Repairs	1.92	cents per	bus mile
Wages of chauffeurs	3.36	cents per	bus mile
Int. dep'n, housing and insurance	3.46	cents per	bus mile
Taxes	2.2	cents per	bus mile
General	1.2	cents per	bus mile
Damages	1.3	cents per	bus mile
	24.82	cents per	bus mile

On a seat-mile basis this involves a cost of 1.24 cents. According to estimates of those interested in bus operation the costs vary through a wide range.

AUTO BUS SERVICE AS A SUPPLEMENT TO SURFACE RAILWAYS

H. B. Weaver, vice-president, Manhattan & Queens Traction Corporation, and engineer for the New York Motor Bus Company, who has, as a consulting engineer, devoted a great deal of attention to auto bus operation, considers that the gasoline-driven vehicle cannot compete directly with the electric railway. It can, however, be used to advantage as a supplement to the street car by operating not on outlying lines but by giving a high grade parallel service at a higher fare. Mr. Weaver's opinions are in part as follows:

"The great problem of the auto bus is not the earning capacity or the abundance of traffic, but rather the operating cost, and it is well to consider in connection with this problem that the small, cheap jitney automobile carrying only about six passengers must operate at one-seventh the cost of a forty-two-seat auto bus in order to equal the passenger-seat cost, which after all is the real basis of computation.

"On the electric railway, the maintenance of rolling stock amounts to 11 per cent of the total cost of operation, exclusive of amortization. In the case of the bus line, the maintenance of rolling stock amounts to 30 per cent of the total cost of operation exclusive of amortization, and this 30 per cent does not include the item of tires which is, in itself, about one-quarter of the cost of maintenance. I have been informed by two of the managers of unsuccessful bus lines, that their buses were in the repair shops in one instance for two-thirds and the other instance for three-fourths of the time. This state of affairs was plainly due to inefficient management as well as to improperly designed vehicles, but it is a striking instance of the cause of failures in an industry which, if properly handled, can be successful.

"I receive innumerable inquiries as to the cost of motor bus operation. There seems to be some vague impression, even in the railroad world, that not only can buses be bought to suit any purpose as readily as one would buy a row boat but that the cost of operation of these vehicles is a definite and predetermined amount. Let us remember that the car mile operating costs of various successful surface lines show variance as high as 100 per cent. Such is true with regard to motor buses.

"However, the following figures show the estimated cost of operation on a particular route of twenty vehicles of the double-deck type, each having a seating capacity of forty-two. These costs were compiled as a result of actual chassis tests over a considerable period of time and after the cost of garage rental, gasoline and other items had been definitely determined. The estimated daily mileage is 85, the schedule speed between 10 m.p.h. and 13 m.p.h., the stops per mile, 5, and the weight of bus without passengers 10,400 lb.

Platform time	4.00	cents per	bus mile
Starters and inspectors	0.50	cents per	bus mile
General	1.00	cents per	bus mile
Lighting and heating of vehicles	0.20	cents per	bus mile
Service	0.10	cents per	bus mile
Dead mileage and layovers	0.33	cents per	bus mile
Gasoline	4.00	cents per	bus mile
Tires	3.00	cents per	bus mile
Car cleaning, oiling and car moving	0.55	cents per	bus mile
Repairs to bodies, motors, etc	3.00	cents per	bus mile
Garage rent	0.33	cents per	bus mile
Depreciation and obsolescence	3.50	cents per	bus mile
Accidents	2.00	cents per	bus mile
Taxes	2.00	cents per	bus mile
Total	24.51	cents per	bus mile

"The cost of tires is a variable factor depending largely on street surface conditions. As an illustration of the uncertainty of this item, I may say that the cost of tires is 2¼ cents per bus mile in the case of one of the largest bus lines in the country. In another instance it is nearly 7 cents per bus mile.

"It will be noted that the cost of operation shown above is approximately 0.6 cent per passenger seat mile, and I may say that the assumed conditions for bus operation are quite ideal. The proposed service is large enough to afford an economical operation and not too large to be cumbersome. Traffic conditions are such as to permit of a very high schedule speed, consequently reducing many of the costs and increasing the annual earnings of the vehicles.



JITNEY BUS—VIEW SHOWING PROPOSED PREPAYMENT BUS WITH LADY CONDUCTOR

"In general, the auto bus has several advantages over street cars. It is apparent, however, that the cost of operation per passenger seat mile, or passenger space mile of the bus, is so much greater than the same cost of surface car operation that the bus cannot hope to compete with the surface lines at the present time.

"However, one important factor must be seriously considered; namely, that the bus is in its infancy and that its efficiency is growing every day. In one large operation in this country the bus-mile cost of operation has been reduced 20 per cent in three years' time. In the City of London the cost of operation per bus mile was reduced in 1909 over the previous year 3.5 cents; in 1910, 1.1 cents; in 1911, 1.76 cents, and in 1912, 1.6 cents, making a total reduction of 8 cents per bus mile in the operating costs during four years.

"This is the situation as I see it. Four years ago the auto bus possessed a limited utility due to its

excessive operating cost. During this time the art has progressed to such a degree that to-day its field of utility has become tremendously increased. This fact has been brought to the attention of the general public, strange to say, by the sporadic growth of the jitney companies or independent jitney operators. The jitneys have not yet proved their own value, but they have shown the practicability of motor buses.

"How shall the streeet railways deal with this problem? I wonder if street railway managers have ever attempted to figure the cost to them of the rush-hour with its over-crowded traffic, which many are prone to consider as their principal source of net profits. If we will be honest with ourselves for a moment, is it not apparent that these over-crowded periods, these unhealthy, dangerous and disagreeable conditions which have existed on almost all transportation lines at certain periods, have been the direct cause of the vicious legislation, unfair regulation, exorbitant taxes and fines initiated by the states, municipalities and courts, which have been imposed upon street surface lines. These conditions have produced a disgruntled, unhappy, bitter citizenry who have been in a mood to look with favor upon anything which "soaked" the cause of their discomfort in the shape of railroad companies. Is not this a prime reason for the jitney's success?

"The motor bus cannot compete with street surface lines in their entirety. It can afford a much better service in many ways, but only on the principle of a guaranteed seat to every passenger at a higher rate of fare than that prevailing on surface lines. There are already many instances in the country where a higher rate of fare is charged in the rush hour than in the non-rush hour. Many of us believe that this is a reasonable solution of the problem. A simpler solution is to operate two types of vehicles, a first class and a second class. The second class would be of large dimensions and would carry a greater number of people with a reasonable number of standing passengers, though free from overcrowding. The first class would furnish a guaranteed seat, and a higher speed, and of course, would have a higher rate of fare.

"There exists in every city a large proportion of the population which will be more than glad, in fact delighted, at the opportunity to ride under such conditions at a slightly increased cost. The motor bus, therefore, should take a position between the street car and the taxicab, and nearer to the street car. In this form it would actually benefit the railways. This is exemplified in New York where my study of the situation shows that there are thousands of cases of women riding to the shopping section under the pleasant conditions which buses provide, although they would not stir out of doors were they forced to use a street car or pay the exorbitant price of a taxicab.

"Aside from this, of course, traffic congestion of the street cars would be relieved to such an extent that I believe a greater harmony would exist between the people and the companies, and, furthermore, that in a few years the rolling stock equipment of a line could be better balanced. In other words, the great surplus of cars needed for the rush service over the normal service could be reduced. Or, to put it in another way, the annual mileage per car would be greatly increased. This would be obtained at no loss to the company because it would be obtained through an increased investment in another type of rolling stock from which a higher rate of fare could be obtained.

"It may be said that still the jitney exists. But we must not lose sight of the fact that after the first novelty has worn off no one would think of riding in an improvised small touring car, crowded in on a longitudinal seat under the most intimate relations with a few passengers, unprotected from the weather, severely jounced about, and disturbed by the boarding or alighting of every other passenger. Obviously one would prefer to ride in a modern, well designed, comfortable street car, provided that street car was not overcrowded.

"The street cars need not fear the operation of autobuses at this time. Their comparatively high operating cost limits their utility as 5-cent vehicles. What the street railway companies should do is to augment their service, even paralleling their own lines with bus lines at an increased fare, or if they do not desire to undertake this service or cannot because of unpopularity obtain reasonable franchise privileges, they should aid rather than obstruct responsible independent companies in the establishment of such lines properly regulated and at a rate of fare in excess of 5 cents.

"The weak point of bus operation is the high operating cost. The crux of the high operating cost deals not with the cost of power as is apparently generally assumed, but with the cost of maintenance, amortization and length of time out of service. There are, on the other hand, certain financial characteristics of motor-bus operation more attractive to the public than street railway operation, and there are many physical characteristics in which the bus excels the street car.

"The comparatively high seat-mile cost of the motor bus should no longer be considered as a prohibition to its use, but rather as a limitation to its utility. This limitation should be first appreciated. The advantages should be carefully appraised and the operation of a proper number of these vehicles at a reasonable fare in conjunction with the street surface lines may well be encouraged."

Electric Storage-Battery Bus Costs

Mr. Weaver's novel conception of a supplementary bus service for electric railways is, of course, based upon the axiom that the bus is more costly to operate than the street car, but this view is combatted by the Peoples 5-Cent Bus Corporation which is endeavoring at the present time to establish a line of 5-cent storage battery buses in New York City. These buses are intended to compete directly with any of the existing means for surface transportation. The estimated costs of operation are shown in the following table, based on a yearly mileage of 30,000, a schedule speed of 8 m.p.h., a maximum of 18 m.p.h. and 10 stops per mile:

Tires	3.0	cents per bus mile
Power	2.25	cents per bus mile
Repairs to body and gear	0.75	cents per bus mile
Repairs to battery	1.5	cents per bus mile
Housing, washing, etc.	1.0	cents per bus mile
Platform wages	8.0	cents per bus mile
Interest	1.0	cents per bus mile
Depreciation	1.8	cents per bus mile
General and administrative	1.0	cents per bus mile
Supplies, licenses, insurance and taxes	1.5	cents per bus mile
Damage claims	..	
Total	21.8	cents per bus mile

These estimated figures apply to buses of the unusual type shown in the accompanying illustrations, two of which are being operated about New York City at the present time as a popular demonstration of what the company proposes to do. The bus seats 36 passengers, and weighs 11,000 lb. including the battery. A 2½-hp motor is geared to each of the four wheels. The proposed schedule will require an acceleration of 1.5 m.p.h. p.s. and the 10 hp of motors is expected to provide this.

The cost of tires as shown in the table has been guaranteed by a manufacturer, the low figure being said to be due to the nature of the drive. Power is figured at 1.5 kw-hr per bus mile and at 1.5 cents per kw-hr. The repair cost for the battery is guaranteed by the maker.

The obviously doubtful points in the estimate are the

items of depreciation, insurance and taxes, and damage claims. Depreciation is based on a ten-year life for all parts of the bus except the gearing (which is given only five years) notwithstanding the fact that the racking strains of travel over city streets causes rapid deterioration, one large bus company that is actually in operation charging off 33 per cent annually for this purpose.

The item covering supplies, licenses, insurance and taxes provides only $450 per annum per bus, although the taxes alone, if equivalent to the average imposed upon electric railways, would be considerably in excess of this figure. Also the neglect of damage claims is open to question, as at least one bus-operating company has to set aside 3 cents per bus mile for this purpose, and because damages amount to more than 1 cent per car mile for the average electric railway according to census figures.

Cost of Jitney Bus Operation

As the foregoing figures apply only to auto buses of the largest type it is interesting to consider the actual cost of jitney bus operation as outlined by a prominent automobile dealer of St. Louis, where the jitney has thrived owing to the refusal of the authorities to bring it under regulation. The automobile dealer estimates the tire expense to be $15 for each of the four wheels for 3000 miles, or a little less than $2 a day, the gasoline 20 gallons at 10 cents, or $2 a day and the driver's wages $2 a day, making the total expense of $6 a day. On the assumption that the income is $10 a day, the net receipts would be $4 a day, or $120 a month. Of this $60 per month is allowed for a sinking fund to provide against accidents, repairs and depreciation, and a net profit of $60 a month is left as a revenue for the owner of the car.

Aside from such minor items as the low price allowed for gasoline, the low wages for the driver and the unreasonably high receipts, this statement constitutes an excellent argument why no one should enter the jitney-bus business. Assuming an average trip of 2 miles, and also the extremely high average of three passengers per trip, it would be necessary for the jitney to make about 50,000 miles in a year if it is to have gross receipts of $10 per day. This mileage is about that which is obtained by the average private car in twelve years. It does not make the allowance of $60 per month for repairs, depreciation and accident look sufficiently large within about 100 per cent. In fact, one accident would wipe out the profit for a year.

The average cost of operating in jitney service a Ford car capable of seating five passengers was stated by representatives of one of the largest distributors in the country to be approximately as follows:

Tires	0.8 cent
Gasoline	1.0 cent
Oil and grease	0.2 cent
Repairs	0.8 cent
Depreciation	0.6 cent
Total	3.4 cents

On a seat-mile basis this would amount to 0.8 cent as the machine offers four revenue seats. If camp stools were put in for two more passengers the cost would be 0.6 cent. This figure, of course, does not take into consideration any such charges as taxes, housing, insurance and accident claims. If, as is indicated by actual records in Seattle, the car makes 100 miles per day and earns $6, there remains only $2.40 per day to pay these charges and to reimburse the driver.

The lack of real profit in the jitney bus is brought out also by the following remarks of M. C. Booth, organizer of the first jitney-bus company in Portland, Ore. The statement was made before the Portland Realty Board and covered actual figures based upon the speaker's experience:

Interest on investment at 6 per cent	$33 per year
Depreciation on car	150 per year
Current repairs	438 per year
Tires	350 per year
Gasoline and oil	430 per year
Personal liability insurance	200 per year
License	5 per year
Overhead charge	52 per year
Incidentals	36 per year
Total	$1694 per year

"Gross receipts," said Mr. Booth, "would be $2190 per year at $6 per day, and deducting $1694 for operating expenses leaves $495 from which must be subtracted $250 to cover fines, damage to other people's property and to the car in case of accident, as well as attorney's fees for services in the police court, leaving a balance of $245 for the operator's labor for the year.

"The reason why so many have engaged in this business is because they cannot find anything else to do."

Receipts Much Overestimated

It is probable that the major part of the jitney craze has been due to the fact that receipts have been greatly overestimated, although the lack of appreciation of real operating cost also has undoubtedly been a material factor in inducing owners of cars to enter the business. As an example of the misconception of the real situation it might be said that in St. Louis the daily earnings of a jitney-bus driver have been reported in general at about $10. This fact has been given wide publicity in the daily papers.

However, on Feb. 20 the manager of the jitney-bus association stated with considerable pride that 4000 passengers had been carried on the day before. This number at 5 cents each would bring total receipts of $200 for the day. Reference to the daily papers shows that there were twenty-two motor cars in operation and two motor buses each with a carrying capacity of thirty. Assuming that the motor buses, with their large capacity, brought in a proper proportion of the receipts, or say $30 each, there would be left $140 to be divided among twenty-two cars. This indicates average receipts for each motor car of $6.40 a day. In addition, it is quite possible that the figure of 4000 passengers was somewhat exaggerated.

In Kansas City the same peculiar discrepancy between reported receipts and actual possible receipts may be noted. A newspaper report of Feb. 10 states that 35,000 passengers were carried on Feb. 9, bringing in a total of $1750. Two hundred jitneys were registered as belonging to the jitney operators' association, and the unregistered drivers were estimated at nearly a hundred more. Assuming that the actual number of jitney operators was 250, the receipts per car came to less than $7. Even neglecting the unregistered drivers the receipts divided among the two hundred registered cars amounted only to $8.75 each.

In Peoria, Illinois, one of the jitney operators estimated that his average day included 25 trips with an average of five passengers a trip, making $6.25 income for the day. This driver had a seven-passenger touring car and he estimated the expense of operating it at about $1 per day, thus making, as he expressed it, "an easy profit of $5 per day for the chauffeur." The length of this driver's route is not known, but if it was more than one mile, his alleged expenses of $1 included only gasoline and did not give any consideration to wear on tires, repairs, depreciation and the like. With such misapprehension of the real facts in the case, it is not difficult to see why numerous owners of cars have been induced to take up the jitney bus as a means of livelihood.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Reports of Meetings of New Motor Vehicle and Way Matters Committees, of Company Section Activities and of Joint Line Construction Committee Meeting

COMMITTEE ON MOTOR VEHICLES

President Allen has appointed a special committee to consider the subject of motor vehicles, consisting of B. I. Budd, president Chicago Elevated Railways, chairman; H. G. Bradlee, president Stone & Webster Management Association, Boston, Mass.; W. A. House, president United Railways & Electric Company, Baltimore, Md., and C. L. S. Tingley, vice-president American Railways Company, Philadelphia, Pa.

The committee met on Feb. 23 and went over a mass of data which had been collected and adjourned to meet on March 16, at which time a report will probably be completed.

JOINT COMMITTEE ON TRANSPORTATION-ENGINEERING

A meeting of the above committee was held in Cleveland on Feb. 12. As the name indicates, this committee comprises members of the Engineering Association and the Transportation & Traffic Association, all of whom, as follows, were present at the meeting: Engineering: R. N. Hemming, co-chairman, Anderson, Ind.; W. E. Rolston, Michigan City, Ind.; R. D. Beatty, Cleveland, Ohio; Transportation & Traffic: P. N. Jones, co-chairman, Pittsburgh, Pa.; J. B. Stewart, Jr., Youngstown, Ohio, and C. N. Wilcoxon, Michigan City, Ind.

After general discussion the committee decided to draw up data sheets covering details of matters pertinent to transportation and engineering. In this the entire membership of the committee will co-operate in order to cover the assignments of the executive committee. These assignments will be found on page 1302 of the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 12, 1914. The committee also hopes to make some interurban train tests with ball-bearings. The next meeting of the committee will be held late in April or early in May.

COMMITTEE ON WAY MATTERS

A meeting of the committee on way matters of the Engineering Association was held at the association headquarters in New York, Feb. 19 and 20. The following members attended: C. S. Kimball, Washington, D. C., chairman; H. F. Merker, East St. Louis, Ill.; E. H. Berry, Cincinnati, Ohio; E. P. Roundey, Syracuse, N. Y.; W. F. Graves, Montreal, Quebec; R. C. Cram, Brooklyn, N. Y.; C. W. Gennet, Jr., Chicago, Ill.; E. M. Haas, Chicago, Ill., and L. A. Mitchell, Anderson, Ind. The work of the various sub-committees for this year was considered by the committee as a whole. A sub-committee to consider further the proper foundations for track in paved streets was appointed and included Messrs. Cram, Haas, Berry and Mitchell. It will consider changes in the four designs of track foundations submitted at the 1914 convention, as well as endeavor to obtain the approval of the American Society of Municipal Improvements of the types finally adopted. The sub-committee considering pavements for use in connection with girder and high tee rails includes Messrs. Graves, Berry and Mitchell. Its work will be devoted principally to securing traffic counts in connection with the various types of pavements. The sub-committee considering specifications with definitions for sundry track materials includes Messrs. Gennet, Haas and Roundey. Standard specifications for special work will be considered by a sub-committee composed of Messrs. Roundey, Merker, Kimball and Graves, who will issue a request to engineers of special-work manufacturers for suggestions relating to specifications for the several types of special work now in use. Specifications will be prepared for the materials used in the various types of special work now generally used. The sub-committee considering the revision of the recommended designs of 7-in. and 9-in. joint plates with special reference to sizes of bolt holes and fits, includes Messrs. Merker, Gennet and Cram. The discussion of this subject was devoted to the advantages and disadvantages of the drive-fit as against the loose-fit bolts. In the review of all existing standards and recommendations originating with the committee on way matters, several sub-committees were appointed to consider the revision of some of the existing standards and recommendations.

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY SECTION

The January and February meetings of this section were joint ones with the local company section of the N. E. L. A. The January meeting, held on Jan. 22, was a social affair attended by 700 persons, including members of the Wisconsin Gas and Electrical Associations which were in convention at the time. The feature of the evening was a musical skit planned and written by the local men, in which Secretary Abendroth appeared as the star performer. President W. W. Cook was also in the cast so could not read his preliminary address which was read for him by vice-president V. M. Dentz. The play was followed by a dance with a grand march led by the presidents of the two local company sections.

DENVER TRAMWAY SECTION

The regular February meeting of this section was held at the club rooms of the north division of the railway on Feb. 18. The subject was "Snow Work and Equipment," a continuation of the topic of discussion begun at the last meeting as described in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 6, page 293. As before, the discussion was opened by W. H. McAloney, superintendent rolling stock, whose remarks were followed by a lively discussion on snow fighting methods and the equipment necessary therefor. Members of the section rendered musical selections and a section photograph was taken. The attendance at the meeting was 150.

PUBLIC SERVICE COMPANY SECTION

At the last meeting of the section, described briefly on page 380 of the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 20, President P. F. Maguire announced that the present membership is 289, and that it has increased 13 per cent since the course in public service economics, described on page 337 of the issue for Feb. 13, was inaugurated. H. C. Donecker, for the program committee, announced that coming meetings will be addressed by Oscar T. Crosby, Warrenton, Va.; George J. Roberts, vice-president Public Service Railway; F. W. Doolittle, director of the fare research bureau of the association; J. S. Doyle, superintendent of car equipment Interborough Rapid Transit Company; R. E. Danforth, general manager Public Service

Railway; P. S. Young, treasurer Public Service Railway, and other prominent specialists in the electric railway work.

In addition to the more formal part of Mr. Donecker's lecture of Feb. 18, he pointed out how the company section plan is designed to benefit both the men and their employers, impelling the former to defend the latter. His impression is that the employees of public utilities do not stand together as they should, being passive or negative in the defence of the policy of the companies employing them. Electric railway employees should realize that the electric railway is only one of several utilities, and co-operation with other utilities is very desirable. Further, co-operation among the departments of one company is necessary. A company must help itself inside if outside help is desired. In order to please the public generally it is necessary to maintain good service and good dividends. The co-operation of all employees is necessary in both of these directions for permanent success.

WASHINGTON RAILWAY & ELECTRIC COMPANY SECTION

The feature of the meeting of this section held on Jan. 25 was the awarding of prizes for papers on "The Duties of a Trainman to the Traveling Public" prepared by starters, conductors, motormen and depot clerks. Thirty-six papers were submitted in the contest. The three prizes of $10, $5 and $2.50 respectively were awarded to Montgomery Davis, starter eastern division; James T. Trout, conductor southern division, and W. M. Rice, conductor eastern division, by H. C. Eddy, engineer District of Columbia Public Utilities Commission, and J. R. Putnam. After the prizes had been awarded brief addresses were given by T. T. Wong, director of the Chinese Government Bureau of Education, and Mr. Eddy. The serious part of the meeting was relieved by motion pictures, vocal music and refreshments. The attendance at the meeting was 48.

The meeting of Feb. 23 was held in conjunction with a meeting of the employees of the Potomac Electric Power Company and Wm. L. Clarke, assistant secretary of the companies, presided. The program was of a non-technical character, comprising musical numbers, motion pictures and an address on "Real Aristocracy." A buffet luncheon was served after adjournment.

ASSOCIATION OF TECHNICAL SOCIETY SECRETARIES

A meeting of the above association, in which the American Association is officially represented by Secretary Burritt, is being held to-day in New York. The purpose of this association, as outlined on pages 917, 991 and 1061 of the last volume of this paper, is to provide for occasional meetings of the secretaries of national societies to consider overlapping interests, the avoidance of conflicts in convention dates and the methods of administration found most effective. In the absence of Secretary Burritt on account of the C. E. R. A. convention, he is being represented by H. H. Norris, associate editor, ELECTRIC RAILWAY JOURNAL.

COMMITTEE ON OVERHEAD AND UNDERGROUND LINE CONSTRUCTION

A meeting of this committee was held in New York on Wednesday, Feb. 24. The minutes will be available in time for the next issue of the ELECTRIC RAILWAY JOURNAL.

COMMUNICATIONS

Corrosion of Metals in Natural Soils

NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C., Feb. 20, 1915.

To the Editors:—

As a contribution to discussion of the article appearing in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 14, 1914, entitled "Corrosion of Metals in Natural Soils" by E. H. Scofield and L. A. Stenger, we submit the following comments:

We have read the article with much interest and regard it as a valuable experimental demonstration of self-corrosion of iron and lead in soils. The paper deals with a phenomenon long recognized but too often overlooked by engineers or not given sufficient consideration. In connection with our electrolysis investigation we have frequently had occasion to call attention to the fact that in certain cases corrosion is due to soil conditions and not to stray currents. Such cases often occur, and this fact renders it important that careful investigations be made to determine the cause of corrosion in any given case. Work of the kind done by Messrs. Scofield and Stenger is of great value and serves to emphasize the need for giving more attention to soil conditions and the physical properties of pipes than is generally done.

It is well to point out in this connection that although soil corrosion usually exists in greater or less degree and under certain conditions may in itself become very serious, such coil corrosion is in general accelerated by the presence of stray currents. This fact is shown in Technologic Paper No. 25 of the Bureau of Standards dealing with the subject of electrolytic corrosion of iron in soils, and some of the principal causes of this accelerated soil corrosion are there pointed out. Because of this tendency, whenever stray currents are being discharged from the pipes, not only will there be more or less electrolytic corrosion, but the soil corrosion proper will be greater than if such stray currents did not exist. Where soil conditions, therefore, are such as to give rise to considerable self-corrosion it is more important that stray currents be reduced to low values than where the tendency toward soil corrosion is small.

It would be interesting to know the chemical analyses of the soils used by Scofield and Stenger, since they were undoubtedly of an unusually corrosive character.

The corrosion due to the presence of two or more electrolytic soils is interesting, but it is probable that soil corrosion in practice is caused in this way only to a slight extent since natural diffusion of dissolved substances in the soil would soon eliminate potential differences due to this cause. Soil corrosion usually is probably due either to a direct chemical attack or to the galvanic action resulting from inhomogeneity of the surface of the metal, although unquestionably there are cases of serious corrosion due to the presence of different soils in contact with adjacent portions of the metal.

These experiments are in accord with a great deal of data previously published which show that it is impossible to establish beyond question that certain cases of corrosion have been caused by electrolysis unless electrical conditions favorable to such corrosion are actually found. On the other hand, it is important to bear in mind that the absence of such electrical conditions at any particular time is not sufficient indication that corrosion that has already taken place was not caused by electrolysis, since electrical conditions may have changed greatly since corrosion occurred. In a case where serious corrosion has been caused by stray currents and the cause of these stray currents has been re-

moved, the only certain way of determining whether the previous corrosion was caused by stray currents or by local influences is by making active corrosion tests in the same soil under the same average conditions of moisture and using the same kind of iron as that previously found corroded. In the absence of a test of this kind, it is not possible to fix with certainty the cause of corrosion.

It would be interesting to know whether the specimens shown in Figs. 1 and 7, which are stated to have been corroded by the action of the soil, have ever been exposed to conditions that might give rise to electrolysis corrosion.

E. P. Rosa, Chief Physicist, and
Burton McCollum, Electrical Engineer.

Stevens Institute of Technology

Hoboken, N. J., Feb. 15, 1915.

To the Editors:—

I have read with interest the article entitled "Corrosion of Metals in Natural Soils," by E. H. Scofield and L. A. Stenger, published in the Nov. 14, 1914, issue of your valued journal.

The authors state that iron and lead in street soils corrode both in the form of "uniform rusting or oxidation," and in the form of "the more destructive pitting"; and that the uniform rusting is generally recognized as a "simple chemical action," while pitting "is usually attributed to electrolysis, and when found in localities where electric railways operate the damage is charged to the action of electrical current originating from the return circuits of such railways." I do not believe that this is a fair statement, as it has long been understood that pitting is caused by rapid localized corrosion which may result from what has been called "simple chemical action," as well as from electrolysis due to stray railway or other external currents. It is nevertheless the fact that the very rapid corrosion of underground pipes and cable sheaths resulting in pitting in a relatively short time is in most cases in practice caused by electrolysis from stray railway currents leaving the pipes or cable sheaths to flow to surrounding earth.

It has repeatedly been pointed out that the appearance of a corroded pipe or cable sheath alone does not suffice to determine whether or not the corrosion has been caused by electrolysis from stray electric current. I stated this in the discussion of a paper on electrolysis before the New England Association of Gas Engineers, Boston, Feb. 19, 1913, and I quote the following from this discussion published in the 1913-1914 *Proceedings* of this Association, pages 66 and 67:

"I believe that I can give a satisfactory answer, namely, that you cannot tell from the appearance of a corroded wrought-iron or steel pipe whether the corrosion and destruction was caused by electrolysis. In the case of cast-iron a graphitic material left as the result of the corrosion usually but not always indicates electrolysis. If corrosion from electrolysis is going on, it is perfectly possible, however, to make a suitable electrical test which will show conclusively whether or not stray electric current is leaving the pipe and is causing the corrosion. For this purpose we use an instrument known as an earth ammeter; we place this next to the pipe and connect it to a recording instrument, and obtain a 24-hr. record of the current flowing from the pipe to the surrounding soil. This record will not only show the presence of current but will also indicate whether it has railway characteristics. If such current is found leaving the pipe it is certain proof that it must produce a corresponding amount of electrolysis. A test of this kind, together with the corroded pipe, affords in my opinion the best possible evidence that we can have of corrosion by electrolysis. The corroded pipe by itself without any connecting electrical measurements will not ordinarily serve as complete evidence."

Wherever a metal in earth is found to be corroded and electric current is found flowing from this metal to earth, this is conclusive evidence that the corrosion is in part due to electrolysis from this current. From a measurement of this current an estimate of the amount of corrosion produced by electrolysis due to this current in a given time can be formed by applying Faraday's law, and it can frequently be shown that the corrosion found is practically wholly accounted for by this electrolysis. Where this current can be shown to be stray current from an electric railway, this is therefore good evidence that this railway current is partly and sometimes practically wholly responsible for the corrosion found.

The article is summarized by the statement "The authors show that electrolytic corrosion can and does occur without stray railway currents, and that two sets of conditions may cause it. Experimental data are given to prove the contentions." The word "electrolytic" in the above quotation appears to me to be used in a sense which is likely to be misleading. What the authors have found is that corrosion and pitting of iron and lead in soil may take place without the presence of stray railway currents, and that the appearance of the corroded metal is the same as the appearance of metal corroded by electrolysis from stray railway currents. In my opinion tthe expression "electrolytic corrosion" should at least in engineering literature be confined to cases where the corrosion is caused by electrolysis from external electric currents and should not be used for cases where the corrosion is due to chemical action in soil.

Albert F. Ganz, Professor of Electrical Engineering.

New York, N. Y., Feb. 3, 1915.

To the Editors:—

The article by Scofield and Stenger on "Corrosion of Metals in Natural Soils," in your issue of Nov. 14th, was one of special interest. It seems, however, particularly unfortunate that both the article itself and your editorial comment should convey the impression that the main facts set forth are essentially new and that they call for revision of our ideas regarding the effects of stray currents.

Nothing could be farther from the truth, for, except possibly as to the methods of experiment, there is nothing in the article not well known to those who keep informed upon this subject. It has been known for a generation, at least, that iron pipes have a limited life in soil, depending upon the character of the pipes and the soil in which they are placed, and that they corroded by deep pitting, by scaling, by general graphitic degeneration and by general exfoliation, prior to the existence of electric railways. It has been known, since prior to 1884, that pipes containing free manganese were subject to rapid destruction by pitting similar to that found where electrolysis, due to stray currents, is active at the present time.

Pipe owners are also familiar with the fact that there are localities where lead service pipes are rapidly destroyed by purely natural soil corrosion, particularly when laid in a substratum of clay and the trench filled with the mixture of soils resulting from the excavation through the surface loam into the clay substratum.

All this has been known and is always considered by qualified engineers making electrolysis investigations.

It is probably true that when the dangers of electrolysis were first recognized, there were some engineers unfamiliar with the subject of corrosion who

thought that the very vigorous attacks, which they observed in the presence of stray current, were phenomena peculiar to stray-current corrosion. These erroneous views were, however, soon dissipated as experienced investigators gave attention to the subject, and there exists at the present time an extended literature giving results of carefully conducted tests, showing the relative rates of corrosion which may be expected in various soils and electrolytes in the presence of current leaving the pipes through a wide range of current densities, the tests with extraneous current being carefully checked against like tests in the absence of extraneous current.

Even as to the Twin Cities we find natural corrosion recognized by C. H. Stone and H. C. Forbes, writing in 1894 as follows:

"We have made careful inspections of pipes taken from a large number of cities, and in most cases we find as stated before that the specimens have the appearance of being acted upon by natural causes, the rate of decay simply being accelerated by the electric current. A few instances, however, have been brought to our attention where no natural decay whatever is apparent; this example, for instance, is one which was taken from the ground in the vicinity of the power station at Minneapolis." (N. E. W. W. Association, Vol. 9, page 26.)

In 1899 Hambuechen studied the comparative rates of corrosion of a large number of samples of iron and steel, using electrolytic corrosion for the purpose of obtaining accelerated tests. He says:

"By use of a suitable electrolyte the iron may be corroded as much by this means (electrolysis) in a few hours as it would be corroded in as many years by exposure to the weather, the resultant surfaces being practically the same in each case. By this method the character of the corrosion in different qualities of iron was studied and from the results obtained by these tests, it is noted that the effects produced by ordinary corrosion and by electrolytic corrosion are similar." (*The Electrochemist and Metallurgist*, Vol. 1, page 79.)

Probably the best exposition of the electrochemical features of stray current electrolysis is found in a classical series of papers which Haber began to publish some eight years ago. Almost in the beginning of his text, we find relative to this problem the following:

"Similar changes have already been observed for twenty-five years past occurring upon cast-iron pipes when electric street railways were not yet in existence, and one finds them also to-day often enough at places where no stray current can be demonstrated or even assumed to be present in case the pipes are located in ground of unfavorable properties." (*Zeitschrift für Electrochemie*, Vol. 12, page 50.)

Any one familiar with the controversial literature bearing upon the choice between iron and steel as material for pipes, knows that pitting is continually referred to as a measure for the rate of corrosion in exposures to the action of steam, acid waters, etc.

In so far, therefore, as the interesting paper of Messrs. Scofield and Stenger undertakes to prove that "pitting" is not necessarily an evidence of electrolysis, it is "love's labor lost," for no one conversant with the subject so contends. In so far as it conveys the impression that hereafter any new or different view of corrosion or electrolysis phenomena must be taken it is distinctly misleading, because both the fact of natural pitting, and its acceleration by stray current are well established and it has been clearly proved that the corrosion due to the current may be expected to occur at substantially the rate indicated by Faraday's law. Laboratory investigations indicate that only in exceptional instances will conditions exist modifying this rate.

While, therefore, it is true that absence of current is no proof of safety to a pipe, it is equally true that the presence of current flowing from the pipe to surrounding soil is a substantially certain indication that corrosion, in excess of natural corrosion, is taking place at a rate determined by the ordinary laws of electrolytic action. Whether the stray current which is found endangering a pipe or other underground structure comes from an electric railway is determined by ascertaining whether the current flowing from pipe to soil varies with the operation of the railway, or, in other words, whether the current-time curve of pipe current follows the load curve of the railway.

F. N. WATERMAN, Consulting Engineer.

The Jitney Situation

MOBILE LIGHT AND RAILROAD COMPANY
MOBILE, ALA., Feb. 15, 1915.

To the Editors:

I have been studying the jitney situation for several weeks and have visited Texas in order to ride on the jitneys and talk with the men operating the cars. I found they were not earning living wages and depreciation on the car, to say nothing of a reserve for injuries and damages. How long they can last is hard to say. The *San Francisco Chronicle* says there were 1400 jitneys in Los Angeles in October and November, 1914, and only 700 in February, 1915. Of this latter number few were engaged in the business last October and November, nearly all of the 1400 having dropped out and new ones to the extent of 700 taking their places.

Although this statement may be true, I believe we shall have jitneys for some time to come, and I think we may look for automobiles seating eight to sixteen passengers with exit and entrance at the front and near the driver. This is the class of jitney I fear more than the other when it comes to permanency. We shall also have the small jitney run by the son of the owner who will make eight or ten trips in the morning and ten or twenty trips in the evening, going to school between times.

Strict regulation and the requirement that the jitneys carry liability insurance to guarantee payment for injuries and damages caused by the negligence of the driver will do more to put them out of business than anything else, other than high operating expense.

It seems strange that so few data have been obtained showing the cost of operating a jitney. Mr. Phipps, engineer of the Public Service Commission of the State of Washington has made a report to the commission in which he placed the average receipts per car at $6.69 per ten-hour day and says that the lowest priced car to operate cost $4.36 per day, including 20 per cent depreciation. The balance, or amount of wages for driver, is $2.33. He gives the average passengers per trip at 3.60. Mr. Phipps makes a mistake I think, in figuring depreciation at only 20 per cent per year, it would be nearer 50 per cent on a new car, and on a second-hand car, which is the kind usually in service, it is nearer 100 per cent. The manager of the Kansas City Association says it is 50 per cent, and he tries to make it appear bright for the car owner, in order to get more in the game. Inclosed is a list of questions showing desirable data if we are to obtain a comprehensive view of the jitney bus situation.

We had five jitneys in Mobile. We have only two now, but the operator says he expects to put on six more. Those in use are running over routes 2½ miles long, making three round trips per hour, or six single

trips, running the round trip of 5 miles in twenty minutes. Being a novelty, they are attracting passengers.

The jitneys run about fifteen hours per day, which makes 225 miles per day and, if this rate is maintained, 82,125 miles per year. This is as much as an ordinary pleasure vehicle will run in nine or ten years, so it is plain that the depreciation, even on a new car would be 100 per cent and on second-hand cars such as are used, it will be 100 per cent in a few months.

I believe the JOURNAL can do a great deal of good in furthering the campaign for regulation and especially the carrying of insurance, and also in the gathering of operating costs of jitneys where they are in operation, including cost per mile for gasoline (lower grade), tires, miscellaneous repairs, garage expense, fire insurance, depreciation, interest on the investment, licenses, taxes and accident insurance.

The guarantee of tire makers and of the automobile manufacturer as to consumption of gasoline and life of car would be interesting.

I inclose an advertisement which we have inserted in one of our daily papers calling the attention of the public and the jitney owners to the facts about the business.

The rapidity with which a passenger is taken to his destination and the frequency of headway are the chief attractions of the jitneys. I have always believed in the single truck cars and in putting on more cars when the traffic required it thereby reducing the headway, and I sometimes think we may have to come to small one-man cars in order to give rapid and frequent service.

J. H. WILSON, President.

[NOTE.—The following are the inclosures referred to in Mr. Wilson's letter.—EDS.]

ADVERTISEMENT OF COMPANY

TEAR UP THE STREET CAR TRACKS

The *Mobile Register* says the tearing up of the street railroad tracks in Des Moines is urged. Suppose that was really done here in Mobile, who would be affected?

First, the fifty-one stockholders, mostly Mobilians. Second, bondholders in Mobile would lose $2,000,000. Among the bondholders are widows, orphans, estates, charitable institutions, benefit associations, persons of small means whose savings are so invested, small merchants, school teachers, professional men, capitalists and banks.

Third, several hundred employes who receive good wages, who would give way to boys at 10 to 15 cents per hour.

Fourth, all persons now paying 5 and 10 cent fares.

Fifth, all school children and persons using transfers. School tickets and transfers would not be practical where there were so many jitney owners.

Sixth, the state, county and city would lose heavily in revenue.

Seventh, property owners who would hereafter have to pave the entire street.

Eighth, persons injured could collect no damage claims, jitney owners not being financially responsible.

Why would the citizens suffer? Because the street cars now charge only 5 cents anywhere in the city and to Crichton, Toulminville and Prichard and only 10 cents to Spring Hill and Whistler, but with the doing away of street cars the jitneys would make no rate lower than 10 cents and 15 or 20 cents to Crichton, Toulminville or Prichard and 40 cents or more to Spring Hill or Whistler. Some streets, like Michigan Ave., Cedar, Franklin, etc., would have no service.

What would the sixty jitneys necessary to supply the profitable service pay the city, state and county? Why, just $1,500 as against $50,000 now paid by the street car company. Yes, *by all means* tear up the tracks.

QUESTIONS ON JITNEY BUS TRAFFIC

The following questions are intended to cover five-passenger and seven-passenger cars and the different sizes of buses used.

Name of company? Name of city? State? Population of city? Jitney cars began to operate? Number owned and operated by owner? Number operated by firms or companies? Number in jitney association? Length of one-way trip? Time of one-way trip? Hours operated per day? Fare? Revenue per car hour? Revenue per car mile? Operating cost per mile? Gasoline? Oil? Tires? Repairs and supplies? Garage expense? Chauffeur's wages? Superintendency? Taxes and licenses? Depreciation? Fire insurance? Liability insurance? Total?

When owner runs car (no charge for chauffeur or superintendent) net earnings for owner? State and county licenses per car? City license per car? Chauffeur's license? Percentage of gross receipts paid? Intangible or franchise tax? Paving tax? Ad-valorem tax per car? Excess number carried above seating capacity? Are passengers carried on running board? Are tickets sold? If so, give price. Are school tickets sold? If so, give price. Are children's tickets sold? If so, give price. Are transfers issued? Are policemen and firemen carried free? Are Sisters of Charity carried free? Are waiting rooms provided? Are white and black passengers separated? Are separate cars run for the whites and blacks?

Do jitneys run in bad weather? Is interior of jitney lighted? Are jitneys classed as common carriers? Is a franchise required? Are jitneys regulated by city ordinance If so, please send copy of ordinance. Do jitneys follow specified routes? Are routes specified by ordinance? Do jitneys operate only in paved streets? What rate of wages per hour is paid to chauffeur?

The following questions are of a general nature.

If an association directs the operation of jitneys, what are its functions? Does the association provide terminals, schedules, starters and other facilities? What are the charges of the association?

Are jitneys permitted to parallel street railway lines of same streets? Are jitneys confined by ordinance or other regulations to streets other than those occupied by street railway lines? Do ordinances require all other vehicles, including automobiles, to stop when approaching street cars taking on or discharging passengers? Are jitneys required to draw up to curb to take on or discharge passengers?

Are jitney owners required by statute or ordinance to carry liability insurance against the public? If so, what are the maximum amount covered by policy for any one person, the maximum for any one accident, and the date? What other important points are covered by policy? Do you know if application for such insurance has been made by an individual or by a company and same refused? What are the reasons for such refusal?

Have any serious accidents been caused by jitney buses? What were the causes of some of these accidents which indicate to you excessive public liability due to improper operating methods, or by condition of streets and street traffic? Have persons injured in such accidents been compensated therefor without suit? Will you give specific instances? In case of verdict have any been able to collect the award? Please give specific instances. What is the general attitude of persons injured by jitneys toward the owners thereof?

Do jitneys make public subscriptions? Do jitneys operate to city parks, and to the ball park? Have you curtailed street car service? Have you decreased number of conductors and motormen, wages of conductors and motormen, number of men in shops, wages in shops, office force, wages of office force, number of heads of departments, salaries of heads of departments and salaries of general officers?

Have you attempted to meet competition by increased car service? Do you operate single or double-truck cars on lines that have competition with jitneys? How many seats per 100 passengers on your cars per entire day and how many seats per 100 passengers during rush hours? Have you considered the operation of smaller cars on more frequent headway?

Are you considering the operation of any one-man operated cars? What is the average fare per revenue passenger, per revenue and transferred passengers, and per revenue transferred and free passenger? Could you abandon the giving of transfers? If buses parallel any of your lines do they confine their activities to your short-haul traffic? How many lines do you operate? How many lines are operated that do not pay cost of operation, taxes and fixed charges?

By what per cent of gross income have jitneys cut into your receipts? What per cent of short-haul passengers do you estimate are now carried by jitneys? Do you contemplate abandoning any lines? Do you contemplate going ahead with improvements and extensions, while the jitney business is affecting you? If you have abandoned improvements or extensions, state estimated cost of abandoned work? Have the operation of jitneys affected the value of your stock and bonds?

Do you think the operation of jitneys will be permanent? If so, what kind of five and seven-passenger cars, or busses? If your employes are organized, has their organization undertaken to combat the jitneys? If so, how? Please give your views on the general subject.

Report on Manila Electric Lines

Results of operation of the Manila Electric Railway, including suburban lines, for the first ten months of 1914 show a decrease in net earnings of approximately 23.4 per cent, as compared with the same months in the previous year. The actual decrease in receipts was $48,882, or approximately 7 per cent; the increase in actual cash expenditures for operation amounted to $36,607, or approximately 11 per cent; the outlay for maintenance of track and roadway, overhead trolley system, etc., increased for the period $4,239, or approximately 10 per cent; the maintenance of cars, shop machinery and tools increased $9,185.91, or approximately 21.3 per cent; the net earnings from operation decreased $85,490, or approximately 23.4 per cent. During the period mentioned the company spent $39,571.90 in improvements over and above those mentioned.

The number of passengers carried during the first eleven months of 1914 was 24,867,641, and for the same period in 1913 it was 25,680,546, a decrease for 1914 of 812,905. During 1914 the company erected four public waiting stations along its line costing about $1,000, and added to its equipment six modern, center-entrance, steel cars of latest design and construction, costing $33,000, and rebuilt twenty of its old cars at a cost of $20,000.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Chemical Department of the Illinois Traction System

BY N. R. BEAGLE, CHIEF CHEMIST ILLINOIS TRACTION SYSTEM

The idea of establishing a chemical laboratory for the Illinois Traction System took definite form during the latter part of 1912, when a chemist was engaged, whose first duty was to design and equip a laboratory where all kinds of chemical testing might be conducted. This laboratory was to be available at all times for testing purposes, to the Illinois Traction System, the Chicago, Ottawa & Peoria Railway and all properties of the Western Railways & Light Company, which are different branches of properties constituting the McKinley System.

The entire McKinley System comprises about 600 miles of interurban railway in Illinois, with shops and power houses, also some twenty-five local utility properties in cities varying in size from 25,000 to 250,000 inhabitants, situated in Illinois, Iowa, Missouri and Kansas. Some of them furnish street railway, gas, electric lighting and steam heating service to the cities in which they are located, while others supply only one or more of these branches of service mentioned. Also from some of these properties, transmission lines furnish power and lighting service to scores of the smaller towns and villages in the surrounding territories.

At the outset, the work to be undertaken was mainly to include those problems of the power houses in which chemistry plays a part, that is to say, the selection of fuels and the provision for efficient combustion through flue gas analyses. The problems with which this department is continually confronted, however, cover a much wider field, involving not only chemical but physical problems as well. With this in mind, the chemical department was made a branch of the operating engineering department under the supervision of R. F. Carley, chief operating engineer. The headquarters were located in Peoria in temporary offices, a permanent location having been designed for it in the new terminal building which is now under construction in Peoria.

Fuel Testing

There are about twenty-five city power plants in operation upon the system, also four large interurban power plants. These require an enormous tonnage of coal each year, and the laboratory work here has been to obtain all possible information concerning the fields and mines from which coal can be secured for these stations. The kinds of coals used are principally the lower grades, or screenings. At present some of this coal is being purchased on contract, namely, it is bought for the heat units contained and not because of the trade name it bears or the locality from which it comes. The quality of these screenings from a given locality very often is far inferior to what might be expected, especially when the mine run coal coming from this same district has the reputation of being high grade. The ultimate aim of this work is toward the discovery of that quality of coal which gives the best results when burned under the conditions existing at the various power plants. This fuel will then be purchased under contract for the heat units contained, or in other words, quantity buying of a definite product from a limited territory will be attempted, rather than the scattered buying of coal, the heat-producing value of which is unknown.

Feed Water Testing

Each of the generating stations require millions of gallons of boiler-feed water. At many of the plants this water contains a certain percentage of minerals in solution which are deposited in the form of scale in the boiler tubes and drums. It is estimated that a layer of scale 1/16 in. in thickness will cause a loss of at least 10 per cent in the amount of water evaporated by a given amount of coal in the furnace. There are innumerable boiler compounds on the market which are fed into the boilers along with the feed water to prevent the formation of scale. These compounds necessarily must be varied with each station and from day to day, hence it will be the duty of the chemical department to furnish the proper water softener. On the other hand, expensive boiler installations were designed not as water softeners, but as water evaporators, and to that end the problem leans toward the classification of all feed-water supplies. Later water softening systems will be installed to remove these scale-forming minerals. At present two water softening plants are in operation, with excellent results. If for any reason the installation of a water softening plant is not practicable, the chemist selects or supplies a compound which is most effective toward alleviating the scale trouble in the boilers.

Lubrication, Etc.

Lubrication problems form the principal study for the street railways and 600 miles of electric interurban lines. The chemist determines the proper lubricants for the best results and defines their correct use. The question of bearing metals and their proper use is also being studied. An analysis of paints to determine those which give the best service on street interurban and freight cars, and on the interurban bridges is also handled by this department. In this latter work the desirability of having standard paints for use throughout the whole system is being considered.

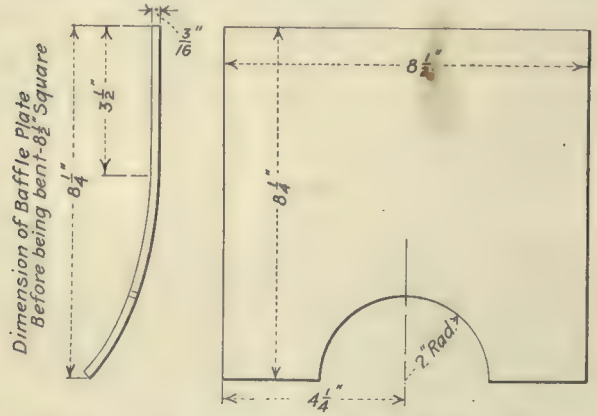
There are also about a dozen gas plants in operation on the Illinois Traction System, the problems of which include the testing of gas coals and the illuminating gas for purity, heating value and candlepower. Methods also are devised by which the largest possible amounts of the by-products are recovered. When these by-products are sold, tests are made to ascertain their percentage purity.

The foregoing are only a few of the problems which have come before the chemical department. Besides these, there are innumerable ways in which the department has been useful, not always in a strict chemical sense. Until recently the laboratory has been in charge of one man. Now an assistant has been added, which allows the chemist more time to devote to the investigation of special problems and to study conditions at the local properties where changes might mean added efficiency and saving.

Baffle Plate for Motor Axle Bearing Caps of GE-73 Motors

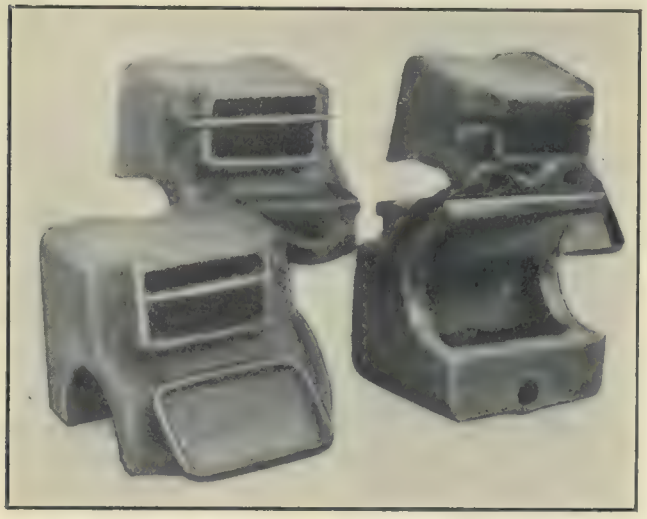
BY RALPH FOX, GENERAL FOREMAN OHIO ELECTRIC RAILWAY, COLUMBUS, OHIO

The mechanical department of the Ohio Electric Railway has made several attempts to devise an appliance that would serve as a baffle plate for the motor axle bearing caps of the GE-73 motors. Until recently



SKETCH SHOWING SHAPE AND DIMENSIONS OF BAFFLE PLATE FOR MOTOR AXLE BEARING CAPS

nothing had been found that proved satisfactory. A short time ago, however, we hit upon a scheme which can be quickly and easily applied. An iron plate 3/16 in. thick and 8½ in. square with an indenture in one side, as shown in the accompanying sketch, is the only thing required aside from an electric welding outfit. The operation is very simple. With the welding outfit, cut two slots in the casting, one on each side of the opening to the oil chamber, as shown in the upper right-hand corner of the accompanying halftone. When this is done, slip the plate into these slots, as shown in



BEARING CAPS WITH AND WITHOUT BAFFLE PLATE

the upper left-hand view. Again using the welding outfit, heat the top of the plate which projects above the casting and at the same time heat the casting until the plate and casting are welded together and the original shape of the bearing cap is obtained. The lower views in the halftone show the completed job.

When completed, this bearing cap is in every way equivalent, from the point of service, to the modern caps in which the baffle plates are integral with the remainder of the casting. The cost is very small. The plates can be secured from any boiler shop, cut to proper size and shape, for a few cents each. One man with a helper will complete about two bearing caps per hour.

This baffle plate serves the same purpose as the "filler" described on page 66 in the article on "Oil-Saving Filler for Motor Axle Cap" published in the Jan. 2, 1915, issue of the ELECTRIC RAILWAY JOURNAL. Our plan was worked out and many applications had been made before the article mentioned appeared.

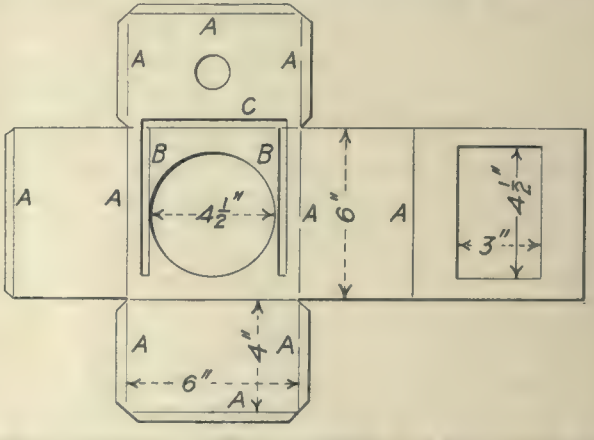
One of the most important results secured by this arrangement is that the jolting that the motor gets tends to bring the packing waste up against the axle instead of forcing it away from the axle, as is the case when no baffle plate is used with this style of bearing. Another important point in the construction shown is that there is left over the oil pocket an opening about 1 in. wide and the full length of the oil box through which an oil gage may be inserted. This opening also permits the oil cellar to be cleared without removing the baffle plate. We have tried gage pipes but find them unsatisfactory.

We have also found the present device an oil saver and good insurance against hot bearings. The GE-73 motor axle cap is much like that of the GE-66 motor.

Tail-Light or Classification Light Box

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTERURBAN RAILWAY, ROCKFORD, ILL.

Many of the older interurban cars have sign panels that are too narrow to allow for electric markers and tail-lights. The Rockford & Interurban Railway has overcome this difficulty by using a small tin box of the design illustrated. The box is cut from a single piece of tin or galvanized iron. If cut according to the sketch no trouble will be experienced in making one. All of the lines marked *A* are bent at right angles, and this can be done in any machinist's vise. The small round hole is for the lamp socket, one of Federal type being the best. The large round hole is for the lens. We use an ordinary lens holder which is soldered to the outside of the box. White lenses are used, but we carry on the car pieces of red and green glass which, when needed, are dropped through the opening *C* into



SKETCH SHOWING CUTTING PATTERN FOR TAIL-LIGHT BOX

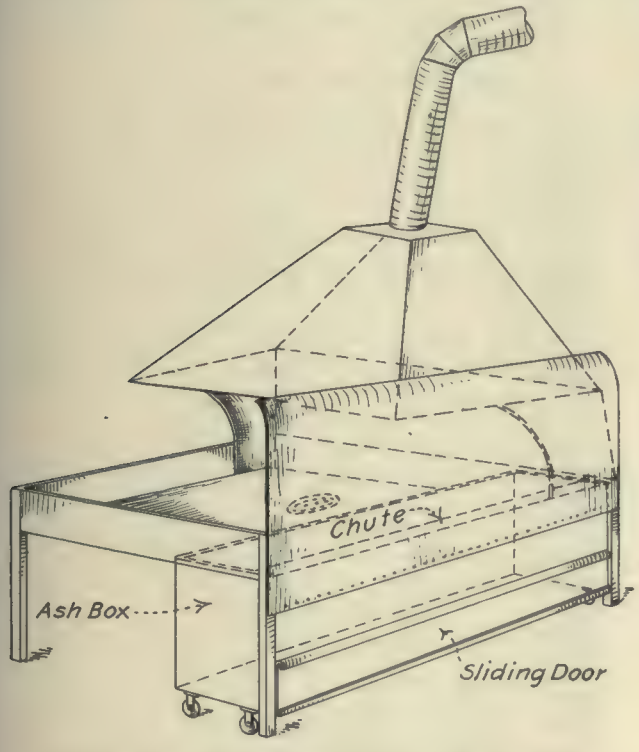
the slides *B* back of the white lens. In this way the boxes can be used on double-end cars for either tail-lights or classification lights. The rectangular hole 3 in. x 4½ in. is for the door whereby access is obtained to the lamp when it needs change. Two U-shaped slides are provided to hold the door. The door is made of a piece of tin with a loop by which it can be handled. Each box is provided with two tin lugs, one at the top and one at the bottom, by which it is fastened to the inside of the corner posts of the cab close to the inside of the window.

Removable Ashpit for Blacksmith Forges

BY J. R. JENKINS, GENERAL SHOP FOREMAN THIRD AVENUE RAILWAY SYSTEM, NEW YORK

Various appliances such as blowers and fans have been installed in shops for the comfort of the employees, but with all these improvements one who enters many blacksmith shops cannot fail to notice that the room is filled with dust while the faces of the workmen are covered with grime. This condition is due principally to the fact that, while cleaning their fires to apply fresh coal, the attendants are invariably more occupied in turning out work than in paying much attention to the disposition of the refuse ashes. In so doing they are very likely to push the ashes off the forge onto the floor, thereby causing the dust to rise and settle on their hands and faces as well as on all parts of the tools and shop. Naturally, some ashes find their way to the lungs of the men.

Always alert for the health of its employees, the Third Avenue Railway System has tried to correct this evil by



REMOVABLE ASH PIT FOR BLACKSMITH FORGE

devising a forge attachment which consists of a box as long as the forge and arranged to fit immediately under the same. This box is made of sheet iron and is set on wheels to permit its removal and also its use under one forge while another is being cleaned. To the outer edge of this box is attached a galvanized iron hood. This hood tends to revert to the draft pipe above, all dust which rises as the fire is cleaned, while the ashes are pushed over to the chute and down into the box. A door, arranged to slide up and down, is attached on the outer side of the box for the purpose of removing the ashes when the box is filled.

This removable ashpit in no way interferes with the heating of long pieces of iron as it can be easily removed and replaced.

The Karachi (India) Tramway has received a franchise to extend its tramway lines. American firms desiring to secure details of the new work should write to the manager Karachi Electric Tramway, Karachi, Sind, Northwest India.

Restoring Loaded Freight Cars to Side Bearings in Rounding Short Curves

BY F. L. HINMAN, MASTER MECHANIC NEW YORK STATE RAILWAYS—SYRACUSE AND ONEIDA LINES

Occasions arise when it is found necessary to move steam railroad freight cars over electric railway tracks which were not originally intended to handle cars of this class. In such cases a great deal of trouble is often met in rounding the short radius curves used in street railway work, due to the turning of the freight car trucks to such an extent that the body bolster bearing is allowed to drop off from the truck side bearings.

A simple device for lifting the body back on to the side bearings, and one not known to many electric railway men, is by means of two hardwood props measur-



ONE OF TWO PROPS USED TO RESTORE A FREIGHT CAR TO THE TRUCK SIDE BEARINGS

ing about 4 in. x 6 in., and approximately 3 ft. 6 in. long, with the ends slightly rounded. The method of application is as follows:

When the truck starts to straighten about as it is leaving the curve, stop the car and place one prop on each side of the car with the top end as near to the bolster as possible and with the other end resting on a block, or on the ground if the latter is hard enough to support the weight of that end of the car.

The props should receive a slight inclination so that as the car is started forward they pivot at the lower end, thereby raising the car body sufficiently to allow the truck side bearings to swing back to their normal position without catching on the body bolster bearings.

A little practice with this device will render the operator very adept at restoring cars to the side bearings, thus saving a great deal of trouble in getting cars around short radius curves.

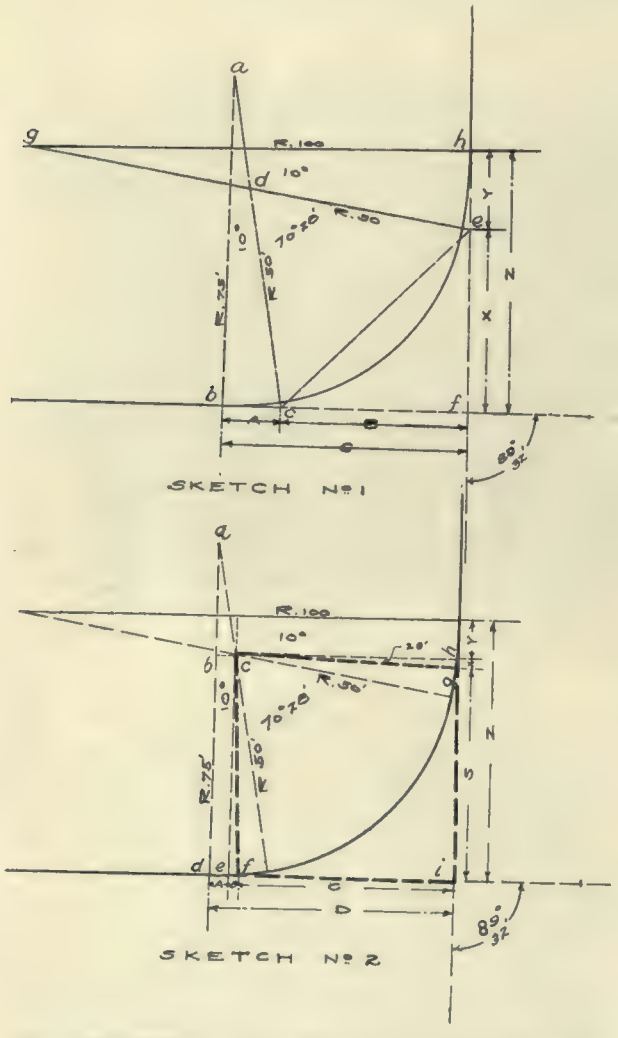
On Jan. 28 the tramway officials of Hull, England, received notice from the military authorities that the whole town must be in complete darkness all night. At first the tramway management was uncertain whether to conduct a service or not but finally decided to do so although it meant no car lights and no street lights and the house lights reduced to a minimum. Our English contemporary, which described this instance, says that fortunately the moon was shining so that the darkness was not absolute. The experience must have been trying although no accident occurred. On the following night the military authorities gave word that lighting could be resumed.

Two Ways of Laying Out a Compound Curve

BY S. STRIEZHEFF, WAY AND STRUCTURE DEPARTMENT
BROOKLYN RAPID TRANSIT SYSTEM

In the routine of his daily task a man gets accustomed to doing his work in a way more or less efficient and according to methods sanctioned by general usage. But occasionally he finds that others go about it in a way which is unusual enough to disturb him somewhat rudely.

The writer recently had occasion to lay out a compound curve for a single-track branch-off and in figuring the tangents made use of the method shown in the accompanying Sketch 2—the so-called right-triangle method commonly used in this kind of work, which affords an easy self-check. He then asked a co-worker, who usually does different engineering work, to check his figures. This he did by the method shown in Sketch 1. This method, as may be seen from the sketch, was rather clumsy and involved a formula for two sides and included angle, and another for one side and angles at its ends. While the result obtained was the same, this instance shows the divergent means that may be used in track work calculations.



LONG AND SHORT WAYS OF LAYING OUT A COMPOUND CURVE

The trigonometrical problem before us is this:

Given two lines making a known angle with each other, to draw tangent to them a compound curve made up of arcs of circles of known radii and arc lengths.

In Sketch 1 it is seen that the problem resolves itself into determining C and Z, the distances from the intersection of the tangents to the points of tangency.

The radii of the curves and the easement angles are chosen from experience. In this case 100 ft. was considered the proper value of the radius for one end of the curve on account of a piece of special work to be installed there. Similarly 75 ft. was chosen for the other end, 50 ft. for the intermediate curve and 10 deg. for each of the easement angles.

When C and Z are known they can be laid off from the intersection f, perpendiculars can be laid off from b and h, the intersecting point d can be determined by laying off ac and ge, giving the centers for the three arcs.

METHOD NO. 1

In the construction shown in Sketch 1

$$C = A + B$$

A can be found from the right triangle abc, i. e.,

$$A = 75 \text{ ft.} \tan 10°.$$

B is one side of triangle ecf of which angle cfe is known, 89° 32′ in this case, and side ce is easily found from triangle dce, thus:

$$dc = ac - ad$$

but $$ac = 75 \text{ ft.} \div \cos 10°,$$

and $$ad = 75 \text{ ft.} - 50 \text{ ft.} = 25 \text{ ft.}$$

Similarly

$$de = ge - gd$$

but $$ge = 100 \text{ ft.} \div \cos 10°,$$

and $$gd = 100 \text{ ft.} - 50 \text{ ft.} = 50 \text{ ft.}$$

The angle cde is 70° 28′, and the remaining side of the triangle is

$$ce = \sqrt{cd^2 + de^2 - 2cd \cdot de \cdot \cos 70° 28'}$$

The other angles are:

$$\text{angle } dce = \frac{de}{ce} \cdot \sin 70° 28'$$

$$\text{angle } dec = 180 - 70° 28' - dce \text{ (just found)}$$

Having solved triangle cde, triangle cfe follows as a matter of course.

side ce is known

angle $ecf = 180 - 80 - dce$ (just found)

angle $cef = 180 - 80 - dec$ (just found)

angle $cfe = 89° 32'$.

One side and three angles are known. Then

$$cf = B = ce \frac{\sin cef}{\sin 89° 32'}$$

Then $$C = A + B.$$

Z can be found in a similar manner.

Q. E. D.

METHOD NO. 2

Referring to sketch No. 2, the distance D can be obtained from three right triangles, abc, cef and cgh, and the parallelogram $cgif$ indicated by heavy lines, as follows:

Draw bc parallel to di. The right triangle abc is known because, as explained in method No. 1,

$$ac = 75 \text{ ft.} - 50 \text{ ft.} = 25 \text{ ft.}$$

As angle $bac = 10°$, $bc = de = A = 25 \text{ ft.} \sin 10°$ and $ab = 25 \text{ ft.} \cos 10°$.

Draw cf parallel to hi. But angle $ecf = 90° - 89° 32' = 28'$, and $ce = bd = 75 \text{ ft.} - ab$ (just found).

Hence

$$ef = B = ce \cdot \tan 28'.$$

To find $fi = C = cg$, we find cg from the right triangle gch. Thus $ch = 100 \text{ ft.} - (50 \text{ ft.} \cos 10°)$, and $cg = ch \div \cos 28'$.

We thus have A, B and C, the sum of which is D. Similarly Z can be found as the sum of Y, X and S.

Q. E. D.

Corrections of Volt-Meter Measurements of Direct Current

G. H. McKelway, distribution engineer Brooklyn Rapid Transit System, advises that a number of errors crept into the calculations in his article entitled "Voltmeter Measurements of Direct Current," as published on page 341 of the ELECTRIC RAILWAY JOURNAL for Feb. 13. The figures which require correction are as follows: 2 ft. of 5,000,000 circular mil wire should be 238 instead of 268 amp per millivolt; 4 ft. of 5,000,000 circular mil wire should be 119 instead of 134 amp per millivolt; 2 ft. of 2,500,000 circular mil wire should be 119 instead of 134 amp per millivolt, and 4 ft. of 2,500,000 circular mils copper wire should be 59.5 instead of 67 amp per millivolt.

In the table referring to length of wire the length under constant "10" relative to 5,000,000 circular mil wire should be 47 ft. 7¼ in. instead of 47 ft. 7 in.; the length of 2,000,000 circular mil wire for the same constant should be 19 ft. 0½ in. instead of 19 ft. 9½ in. The length of 1,000,000 circular mil wire under constant "1" should be 95 ft. 2½ in. instead of 95 ft. 3 in.

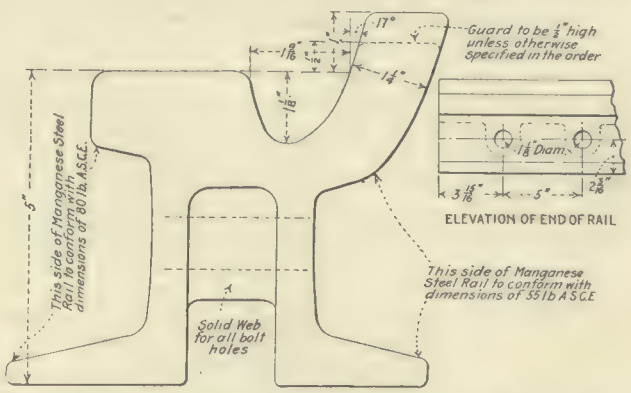
Equipment Cost Data

The following data are from the expenditures of the Worcester (Mass.) Consolidated Street Railway and are printed for the convenience of engineers making estimates. They are drawn from the exhibits filed by the company with the Massachusetts Public Service Commission.

	Total	Unit Cost
POWER BUILDINGS AND EQUIPMENT		
Erection of substation building and installation of two 1500-kw rotary converters, complete with transformers, lightning arresters, switchboard, etc., Madison Sq., Worcester	$103,582.05	$34.52
Addition to brick and concrete building Millbury power station and installation of one 5000-kw turbo generator, four Edgemoor boilers, four stoker equipments, condenser, heater, feed pumps, etc	272,539.11	54.50
Four Vigilant Safety water columns and fixtures for Millbury power station	118.55	29.64
Thirty-eight Pyrene fire extinguishers for power and substations	207.22	5.45
Installation of 2.5-kw. engine and generator at Charlton City power station, for plant lighting	269.58	107.50
New ogee expansion ring for 200-hp Manning vertical boiler	510.00	510.00
One steam tube cleaner for Fremont Street power station	318.50	318.50
LINE AND WAY		
0.5 mile No. 0000 weatherproof feed wire	492.45	984.90
One Duntley track drill	226.25	226.25
One rail bender	16.00	16.00
Eleven electric track switches, Worcester	2,090.52	190.94
One 8-ft. x 10-ft. waiting station, West Boyleston	64.75	64.75
16-ft. x 50-ft. addition to Uxbridge car house lobby, heating	674.21	674.21
ROLLING STOCK		
Two double-truck snow plows complete with four GE-80 motors	9,370.62	4,685.31
Three 40-ft. gondola trailer cars, with air brakes, trucks, etc	2,971.48	990.49
Two 30-ft. Wason closed cars, each two Westinghouse 101-B four-motor equipments complete with air brakes	7,831.70	3,915.85
Five new 45-ft. express cars, 4 GE motors, each complete	29,066.42	5,813.28
ROLLING STOCK DETAILS		
Replacing thirty-two cast-iron 34-in. wheels with steel-tired wheels on four open cars	1,174.00	36.70
Three sets Taylor trucks, complete for GE-67 motors	1,370.43	456.81
112 34-in. steel-tired wheels 4¼-in. rough bore, from National Car Wheel Company	3,619.13	32.30
One four-motor GE-80 equipment, complete for supply car	2,197.98	2,197.98
Two GE-80 four-motor equipments	5,286.08	2,643.04
Fifteen sets Allis-Chalmers AA1 motor-driven air compressors, complete with engineer's valves, gages, etc	3,238.95	216.00
Twenty-four Titan axle gears for GE-80 motors	715.20	29.80
Equipping 130 cars with Murphy sand boxes	2,089.44	16.10
Equipping 250 cars with 15-ton jacks with compartments	3,611.03	14.50
Three Crouse-Hinds arc headlights	36.06	12.02
Six Neal electric headlights	33.60	5.60
Fifty Knutson trolley retrievers	682.82	13.65
Installation of motormen's seats in sixty-five cars	208.50	3.21
Installation of side guards on 102 single truck open cars	2,674.46	26.20
SHOP EQUIPMENT		
One 27-in. engine lathe for Market St. carhouse	986.72	986.72
One Bay State compressed air vacuum cleaner and equipment	1,200.00	1,200.00

Manganese Double-Web Guard Rail

In Mr. Bernard's article on "Car Life of Plain Curves," published on page 383 of the ELECTRIC RAILWAY JOURNAL, reference was made to a manganese steel double-web section for inner rail employed for the renewal of the eastbound plain curve. The accompanying



MANGANESE STEEL DOUBLE-WEB GUARD RAIL, 80 LB. A.S.C.E. SECTION

sketch shows details of the rail mentioned. Mr. Bernard, who is assistant engineer way and structure department, Brooklyn Rapid Transit System, advises that this section has given satisfactory results in all shallow special work where solid manganese steel construction was used. It has proved quite an advance over the former practice of using a T-rail section with a bolted-on guard.

Steam-Electric Tunnel Crane

A combination wrecking crane built for either steam or electric operation has recently been received by the Michigan Central Railroad for use in and about the Detroit River tunnel. It is hoped, of course, that an accident may never occur in the tunnel itself, and in order that the crane need not be idle under normal every-day conditions, it is adapted for ordinary uses outside the tunnel as well as for special use underground. To this end, energy for operation may be taken from the third-rail or from a flexible cable carried on the crane, but if outside the limits of the electric zone and beyond the reach of the power cable the crane can be operated by steam from any outside sources, such as an accompanying locomotive. It is then available for regular wrecking duty, or for construction and yard work.

In general the construction is like the 120-ton capacity steam wrecking cranes which are standard on American railroads. The car body is 26 ft. long and 9 ft. 6 in. wide, and the weight of the crane is distributed over a wheelbase of 19 ft. 8 in. Telescopic outriggers are provided for adding stability during heavy lifting. Air and hand brakes are furnished with provision for both automatic and straight air. The complete air-brake system is under the control of the operator, with engineer's valve, electric air compressor, etc.

No boiler is furnished with the crane, but when desired steam is taken from an outside source through suitable piping. This is so arranged by means of a steam-tight slip joint at the center of revolution that the crane will slew more than 180 deg. in either direc-

tion beneath the pipe without interference. When the crane is operated by electricity this piping revolves with the crane.

For electric operation there is provided a motor wound for 600 volts d.c. and having a capacity varying from 200 hp for a short period, to 115 hp for one hour's continuous service. This motor will operate on fluctuations of line voltage ranging from 300 to 700 volts. The controller is of the street railway type with cast-grid resistors. Current is taken from the third rail shoes through a collector ring. It is delivered to a switchboard that is furnished with all necessary switches and instruments for operating the electric air compressor, cable reel, third-rail shoes, lights, etc.

An interesting feature is the automatic cable reel for paying out and reeling in the main power cable. This reel has capacity for 500 ft. of insulated power cable. It is operated by a motor and the automatic control is obtained by the action of the motor alone, without the use of any intermediate or external mechanical devices, such as friction clutches, etc. This motor has current on at all times the crane is in service and taking current through the cable, so that practically constant torque is exerted by the motor with consequent practically constant pull on the cable. Any change in the pull on the cable, such as would be produced by the crane moving forward or back, results automatically in the desired paying out or reeling in of the cable. The motor is capable of standing stalled continuously without danger to its parts from over-heating.

The motions of hoisting with either the main or auxiliary hoist, varying the boom radius and slewing, are independent of each other and, with loads up to the limit of its power, these motions can be performed simultaneously. With its maximum load of 120 tons the crane is capable of slewing at the rate of a complete revolution in one minute if deemed a safe speed. The boom may be raised or lowered under full load. There is provided a special drag or pulling line connection attached to the underside of the boom. When self-propelled by either steam or electricity the crane has a speed of about 4 m.p.h., but it may be safely hauled in regular trains over main line tracks at a speed of 60 m.p.h. This large crane was constructed by the Industrial Works of Bay City, Mich.

The maximum radius of the main block is 25 ft. and the minimum is 16 ft. Capacities of the crane are as presented at the top of the next column as follows:

With outriggers in position.
Main hoist, 240,000 lb. at 17-ft. radius.
160,000 lb. at 20-ft. radius.

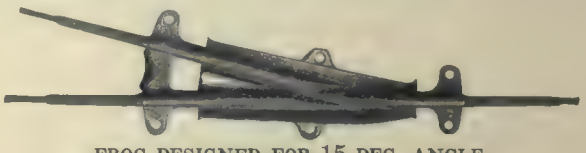
With end outriggers only
Main hoist, 140,000 lb. at 16-ft. radius.
Auxiliary hoist, 30,000 lb. at 25-ft. radius.

Without outriggers
Main hoist at right angles, 44,000 lb. at 16-ft. radius.
32,000 lb. at 20-ft. radius.

Auxiliary hoist, 24,000 lb. at 25-ft. radius.

Trolley Frogs for One Degree of Angle

An addition to trolley frogs designed in only one degree of angle regardless of the degree of track curvature, necessitating the carrying of only one right-hand and one left-hand style, is the Westinghouse type BR. This is a trolley frog without movable parts that can be used at points where high speeds are obtained, the design being such that the trolley wheel does not travel on its flanges. Therefore no bump, and consequent displacement, occurs when the bearing of the wheel is transferred from the groove to the flange. The type BR is asserted to be the only trolley frog that will prevent a wheel from traveling on its flanges without using mechanical or electrical devices in connection with a movable tongue. The illustrations show this frog for a 15 deg. angle designed for city service, though the company is prepared to furnish this type of frog in either an 8 deg. or 10 deg. angle for high-speed interurban service.



FROG DESIGNED FOR 15 DEG. ANGLE

The malleable iron frog has recently become popular on account of its long life as compared with the bronze frog, although a great many operating men prefer the latter on account of the longer life obtained from the trolley wheels. This argument does not apply to the present malleable iron frog, as the resistance to the passage of the trolley wheel is asserted to be less than with any design of bronze frog.

This type can be placed almost directly over the track switch point, preventing the side wear of the wire caused by the angular riding of the wheel before it enters the frog. When the frog is placed in its proper

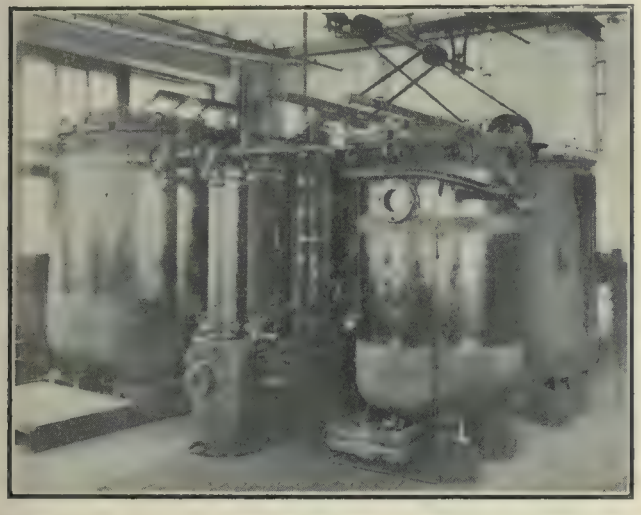


STEAM-ELECTRIC WRECKING AND CONSTRUCTION CRANE FOR MICHIGAN CENTRAL RAILROAD DETROIT RIVER TUNNEL

location the wheel will be in a position to engage the turnout runner before it commences to grind the side of the wire. Due to the over-lapping of the runners, as shown in the illustration, practically continuous contact of the tread of the wheel is afforded during the period of transition.

Hints on the Impregnation of Railway Motor Coils

The reinsulation of formed wire by impregnation, especially for field coils of traction motors, has become a regular feature of electric railway practice, for with proper workmanship a saving up to 25 per cent of the cost of a new coil is attainable. Many of the early attempts at impregnation were not successful, because both railways and manufacturers lacked experience and proper equipment. In recent years these drawbacks



QUADRUPLE TANK EQUIPMENT FOR VACUUM IMPREGNATION OF COILS

have been overcome by organizations which make the impregnation of field coils either their sole business or a logical part of their other electrical work. The Electric Operations Company, Brooklyn, N. Y., is a concern of this character, and the following explanation of its impregnating practice, as given by A. M. Leacock, manager of the electric railway department, should therefore be of value.

The company uses steam-jacketed tanks, one being the liquid (compound) tank and the other the vacuum tank. To the latter tank is connected a compressor for supplying compressed air or vacuum as desired. The two tanks are connected at the base with a valve intermediate. Coils to be treated are placed in the vacuum tank after they have been covered with one layer of tape. In this tank they are allowed to dry while the compound is liquefying in the liquid tank. After the highest possible vacuum has been maintained, say, for four consecutive hours, the intermediate valve is opened and compound is admitted to the interior of the vacuum tank until the coils are submerged. Then the compressor is reversed and air pressure at 80 lb. per square inch is applied for four hours more, after which the compound is drawn back into the liquid tank at low pressure, the valve is closed and the coils are allowed to drain for one hour.

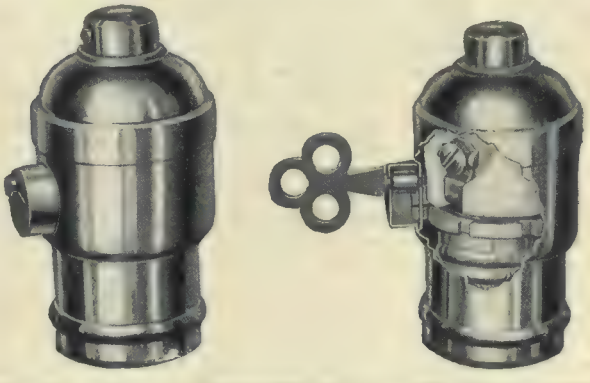
The compound used on railway work should have a dropping point of at least 215 Fahr., and the heat should be sufficient to make it perfectly liquid. When the dropping point is assured as correct it is well to unwind a coil periodically to make certain that the penetration is perfect. A compound of high dropping point with insufficient heat is always followed by poor results in penetration, and a compound of low dropping point should be detected by the ordinary use of a test tube and thermometer. To have these two features exactly right is most essential.

In preparing old coils for impregnation it is wrong to assume that any coil reading O.K. in resistance may be successfully treated. Aside from the fact that the wires may be distorted from mechanical strain under vibration, the accumulation of decayed insulation forms a barrier against the compound under air pressure which prevents the impregnation of the interior of the coil. Most coils, possibly 90 per cent, require rewinding and reinsulation of the wire before treatment. Such rehabilitation demands much skill based on long experience in order that each turn may be replaced correctly and the coil made to assume the proper weight and resistance. When the coil is completed for service it should receive a final test for mechanical strength. This may be done by placing it under a pressure of approximately 2 tons with a resistance reading instrument in circuit. Any weaknesses of insulation or mechanical errors will thus be easily detected.

Locking Sockets and Receptacles to Prevent Lamp Thefts

The General Electric Company has recently marketed an improved design of locking sockets and receptacles of both the key and keyless types. These sockets and receptacles afford positive protection to lamps in cars and waiting rooms where losses of lamp bulbs often occur. They also prevent the theft of current.

The locking device on the sockets effectually prevents



LOCKING SOCKET AND RECEPTACLE; CONSTRUCTION OF THE LOCKING SOCKET

the removal of lamps by unauthorized persons. Lamps can be inserted and removed only by aid of the key, and the improved principle of the design also provides against breakage from tampering. When the key is removed, the screw shell of the socket swivels freely, thereby avoiding injury either to the lamp base or socket if a sudden attempt is made to twist and remove the lamp bulb without the key.

The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., reports that during the year 1914, 92.25 per cent of its trains were on time. Summarizing the averages of delays to train service and comparing them with the previous year, the following figures are of interest: Total number of trains operated, 1912; total number of minutes delayed, 4120. A comparison of the per cent of trains on time during 1913 and 1914 shows 89.9 per cent and 92.25 per cent respectively.

News of Electric Railways

NEW YORK COMMISSION INVESTIGATION

Commissioner Maltbie, on Commission Since Its Organization, Before Investigating Committee.

At the hearing on Feb. 24 before the legislative committee which is conducting the investigation into the Public Service Commissions of the First and the Second Districts of New York, Milo Roy Maltbie, a member of the First District Commission since it was formed in 1907, who had been the witness for several days, resented the attitude of the committee, dealt with his conferences with the Mayor and other city officials, referred to steam-roller tactics by the commission and said he shocked certain people by asking for a bill for gasoline used on the one private trip that he took in a commission automobile. Mr. Maltbie is quoted as saying:

"References have been made here to conferences I have had with the Mayor, Mr. McAneny and Mr. Polk. I have had such conferences and they have come about in this way: It has been necessary to confer with them in matters requiring the city's approval. I have done my best. When I have seen the steam roller of the commission start I have gone to the Mayor and to Mr. McAneny and asked them to help me prevent things from going through that ought not to go through. Together we have kept things from being approved that would have been detrimental to the city. It was the only way I had. I tell you when a man works as a minority of one and knows he does not hear of things until a week after they are under way he has to do the best he can. I haven't a word of apology to offer for my conferences with the Mayor, Mr. McAneny, Polk and others.

"This committee has set so high a standard that it cannot be lived up to. A new commission of five would delay the new subways while they are studying the many subjects involved just as the addition of each new commissioner has tended to do. If you have archangel standards you are bound to fail. If you get men whose hindsight is no better than their foresight they will be so far up in the clouds the city will not be able to see them.

"In regard to the trip that I made to Tuxedo in April, 1914, in the automobile I consider that under the circumstances I did what I ought to do. I paid for the gasoline, and I tell you when I went to the auditor and asked him for the bill some people were shocked over there. I have been on the commission seven or eight years and I think this is the only instance of a personal trip out of town in a commission car. I say there was nothing wrong in what I did. Everybody knows the cars are used by public officials to take them home. A man ought not to abide by just what the law requires, something he must do to escape from going to jail. It is a matter of conscience with a keen edge. A man ought to have one and live by it. Produce all the cards, and I declare here and now that the difference between the cards of any other public official in New York and mine will be so striking it will attract attention. I tell you they were shocked over there when I wanted to pay for my one pleasure trip. I am not going to repeat parrot-like what's been said here about the use of the cars. I have often called for a car to come to my home when all the commission's cars were in use, and I have paid for those cars out of my own pocket when I have gone on public business. I tell you that if the balance was struck I would get a dividend."

William M. Ivins was the other witness on Feb. 24. He expressed himself as theoretically in favor of one seven-men commission for the whole State, three of the members of which would be selected from up-state, three from New York City and one from any part of the State to act as chairman. It would be an economic waste to dispense with the present law, which had been in a large measure interpreted and determined. He favored careful amendment and consolidation of certain sections of the law. He sounded a warning concerning too great regulation and said that if the Board of Estimate of New York adopted the policy of its Bureau of Franchises, private capital would be driven away from public utilities and the city would be confronted with the necessity of adopting municipal ownership and providing for all utilities out of taxation. He attacked the provision of the law which made men connected with public utilities ineligible for appointment to the commission.

On Feb. 18 evidence in the shape of pictures of fused cables and of drilling holes was presented to bear out the assertion made on the previous day by William Hayward, counsel to the committee, that the real cause of the subway accident at Broadway and Fifty-first Street was the drilling by contractor's employees into a feed cable, in a cable duct, which was short-circuited by the contact of the steel-pointed drill with the charged wires. The members of the investigating committee and Colonel Hayward went into conference to determine whether or not it was best for the committee to carry its investigation into the relation of the man-hole accident to the accident at Fifty-third Street. It was finally decided that it would be outside of the scope of the committee's work. Meanwhile the Public Service Commission was conducting an inquiry into the causes of the accident simultaneously with the inquiry by the committee. Reference to the inquiry by the commission is made on page 432 of this issue.

Considerable time was spent on Feb. 18 in going over the details of the previous day's testimony. Commissioner Maltbie was called as the witness. He favored the extension of the jurisdiction of the commission for the First District to include all of Long Island and Westchester County. He had never found any difficulty in securing the co-operation of the commission for the second district whenever the interests of the commissions had over-lapped. Five men had all they could do to cope with the work of the commission. The question as to whether or not the present salaries were sufficient was an academic one. He agreed with the other commissioners, all of whom had testified, that the commission for the first district should have jurisdiction over the telephones.

On Feb. 19 Mr. Maltbie asked permission to amend his testimony of the previous day in regard to the length of time needed to complete the plans and specifications for the dual system. He had previously thought it would take a year, but consultation with the commission engineers had led him to cut that time in half. Mr. Maltbie thought it would be advisable to give the city entire control over its own property. He said, however, that he had no objection to the Governor appointing a Public Service Commission since every member of the commission must be a resident of the city. He did not think the Board of Estimate should take over rapid transit work. He did not agree with Senator Foley, who suggested that the work of the commission should be undertaken by commissioners elected by the people. An ideal arrangement would be a consolidation of the present Municipal Department of Bridges and Docks and the transfer to it of the rapid transit work of the Public Service Commission. Latterly there had been frequent informal conferences at which Commissioners McCall, Wood and Williams had participated. A year ago stock and bond cases were under his jurisdiction. They were then taken from him and assigned to Commissioner Williams.

The precedents established by Mr. Maltbie in capitalization cases were: a dollar of property for a dollar of security except in the case of amortized bonds; no issue of security except for actual expenses checked by the commission's engineers; no approval of an issue of bonds unless it could be demonstrated that the interest could be earned; bonds refunded must represent property in existence; all expenditures to be checked by the commission's engineers to show whether or not they were capital expenditures. Since the transfer of supervision over capitalization from him to Mr. Williams four cases had arisen in which Mr. Maltbie had contested Mr. Williams' report. In one of them he had been sustained. In the others he had been overruled. Every commissioner was responsible, of course, for his action on the board, but the primary responsibility of each commissioner was for his own work. Division of responsibility destroyed responsibility. According to Mr. Maltbie, the Brooklyn Rapid Transit had been more evasive than defiant. The Interborough Rapid Transit Company

showed a persistent determination in disregarding orders.

Mr. Maltbie presented a table showing the number of cases heard and opinions written. During the last six months of 1914 there had been 220 hearings. He presided over 115, with the balance divided as follows: McCall, two; Williams, forty-two; Cram, forty-nine; Wood, thirty-two. The record of opinions in the year 1914 was Maltbie, twenty-eight; McCall, two; Williams, six; Cram, four; Wood, two; Eustis, seven. Colonel Hayward presented a table showing that from 1907 to 1914 inclusive, Mr. Maltbie had 204 out of 1,286. Mr. Maltbie replied that it was not the number of cases, but the hearings and opinions that counted.

Commissioner Williams objected on Feb. 20 to Mr. Maltbie's testimony in regard to secret conferences. The committee promised to afford him an opportunity to appear before it again, and this he said he would probably do after the testimony of Mr. Maltbie had been transcribed.

There is a great deal of speculation in regard to the outcome of the investigation. Rumor had it on Feb. 22 that so far as the commission for the first district was concerned Messrs. McCall, Cram, Wood and Williams would probably be replaced by Col. William Hayward, counsel for the legislative committee; Travis H. Whitney, now secretary to the commission; William R. Willcox, formerly chairman of the commission, and possibly Prof. Edwin R. A. Seligman of Columbia University. It was thought that Mr. Maltbie would be continued with the commission.

DETROIT MUNICIPAL OWNERSHIP PROPOSAL

Text of Proposition to Detroit United Railway Looking to Municipal Ownership in That City

The Detroit Street Railway Commission has proposed to the Detroit United Railway that it will submit to the electors at an early date a proposition to have the city assume the bonded indebtedness of the lines, amounting to $24,900,000, and if approved by a three-fifths vote of the electors the city will take over the lines within the one-fare zone. The commission has given the company ten days in which to accept the proposition and states that if it is not accepted other means will be taken to secure municipal lines. The commission's proposition for the acquisition of the lines, as sent to J. C. Hutchins, president of the Detroit United Railway, is as follows:

"1. For all of your property, real, personal and mixed, including franchises and franchise rights, except cash, accounts receivable and securities, called, of the city of Detroit, as of this date, the city, to the extent of its power, will assume the payment of the mortgage debt of the Detroit United Railway not exceeding $24,900,000.

"2. The title to the property to be absolutely free and clear on the date the transfer is effected from the Detroit United Railway to the city of Detroit, except the mortgage debt aforesaid.

"3. The board of street railway commissioners, in the name of the city of Detroit, to take possession of the property immediately upon the ratification of the proposition by the requisite number of electors of said city voting thereon at an election at which the proposition may be submitted, and shall be enabled to operate the same as a railway system for the accommodation of public travel.

"4. Your company to keep and maintain the property in its present physical efficiency until the date upon which the property passes from the possession of the Detroit United Railway to the possession of the city of Detroit.

"The board is moved to make this proposition in the belief that this method will afford an opportunity for the city of Detroit to acquire a street railway at the earliest possible date. Time is the essence of this proposition, and the board expects a reply within ten days from the date hereof. If your company fails within that time to indicate in writing its willingness to enter into a contract on the terms substantially as stated in the proposition herein outlined, then the city of Detroit will proceed to secure a street railway system by other ways and means."

The figure named by the commission is about $3,000,000 in excess of the appraisal total compiled by Prof. E. W. Bemis for the city and about $5,000,000 less than the amount asked by the company for its lines within the one-fare zone.

No official statement has been given out by the commission as to its plans for meeting the mortgage obligations which it proposes that the city shall assume, but unofficial information is to the effect that the commissioners believe the earnings of the lines will pay the interest on the bonds and provide a sufficient sinking fund to pay the mortgage which expires in 1932. The commission will not make any statement of its ideas until it has received an answer from the company on the proposition submitted to it.

MUNICIPAL OWNERSHIP IN SEATTLE

Communication from Mayor Gill Dealing with the Question of the Deficit of the Municipal Railways

With only $127 left of the original $9,000 appropriated from the general fund last March to the credit of the Seattle Municipal Railway, Division "A" and possibly Division "C" of the city-owned system may cease to be operated unless the Council takes immediate steps to finance the utilities. Approximately $36,000 was provided in this year's tax levy for the operation of the two divisions. As the lines were expected to earn their own way it was figured that the revenues from the lines would be equal to the amount expended. As this does not seem possible, the Council is expected to make an appropriation from the general fund as a loan against the street railway fund to insure continued operation. This loan can be repaid through earnings of the roads above operating expenses if they attain a paying basis or absorbed in the tax levy of 1916 as a 1915 deficit. Mayor Gill recently served notice on the Council to the effect that after the remaining $127 is exhausted an appropriation must be authorized by ordinance to operate the lines before additional indebtedness is incurred. Councilman Fitzgerald, chairman of the finance committee, and Councilman Erickson, chairman of the city utilities committee, say that a deficit ordinance is not necessary to appropriate money to operate the road. Five votes are required to pass a bill making a loan from the general fund. Writing to the Council, Mayor Gill said:

"On March 18, 1914, you appropriated $9,000 from the general fund to the credit of the municipal street railway fund. I presume it was supposed that with this sum and the earnings of the street railway the lines could be operated without further city aid. To this sum the earnings of the lines and your appropriations from month to month have been added to keep up the operation of the lines, and such amounts have been charged against this fund. I am advised by the superintendent of public utilities that the balance of this fund on Feb. 1, 1915, was $127. This shows that since beginning operation the lines have fallen behind the entire $9,000. In May, 1914, I addressed a letter to the heads of each department of the city over which I have control, forbidding in the future the expenditures of any funds, without an appropriation by the Council covering the expenditures, and while that communication might not entirely cover this instance, I wish it to apply in this case as well as any other. If a deficit is to be created in order to keep these lines in operation, it can only be done when you have placed sufficient money in this fund to cover such deficit.

"Possibly this is not the proper time to discuss this matter, but the future operation of these lines, or at least of Division 'A,' until such time as it has been connected up with something is one that is entitled to very serious consideration, and I suggest that if it is your desire to continue operation, you immediately pass an ordinance placing money in the city railway fund. In case you do not make such appropriation I shall instruct Superintendent Valentine, of the municipal railways, to cease operation on Division "A" when it becomes apparent that the amount appropriated for the street railway fund has been exhausted. In the meantime I shall be glad to take up the matter of these lines with you at your convenience."

Mayor Gill said further:

"People bought homes in the Lake Burien District, served by Division 'C,' and made improvements with the expectation that the city would continue to operate a railway system there. It would not be fair to them, in case no money is directly available for the Lake Burien Railway fund, to close down the line. There is no such moral obligation, however, as regards the operation of Division 'A,' which line is a financial burden."

DES MOINES FRANCHISE MATTER

The Des Moines (Ia.) City Railway has been granted an extension of time until June 22 in which to negotiate a franchise with the city. The date first set by the State Supreme Court was March 22 and on account of the failure of the recent franchise election effort the company asked for an extension of time, which was granted by the court.

After the company had secured a petition for a franchise election and the City Council had fixed the date for the election the same was invalidated because of illegal election notices published by Mayor James R. Hanna. When the mistake was discovered it was too late to publish correct notices.

The City Council has been drafting a new franchise for submission to the company. This has been characterized by Emil G. Schmidt, president of the company, as less acceptable to the company than the first draft by Mayor Hanna. Mr. Schmidt is expected to return to Des Moines within a short time and a move toward a final settlement may then be made. The Greater Des Moines Committee and officers of the Harris Trust & Savings Bank, Chicago, have conferred recently regarding the settlement of the franchise question.

PORTLAND VALUATION FIGURES

The valuation of the entire property of the Portland Railway, Light & Power Company, Portland, Ore., as shown in the examination of W. J. Hegenah, who made an inventory of the holdings of the company, is placed at $56,942,464, according to information given out by the Railroad Commission of Oregon. The estimate includes:

Roadway and tracks	$8,694,866
Buildings, fixtures and grounds	4,357,145
Land	9,076,326
Rolling stock and float equipment	4,557,736
Hydraulic power works	6,046,033
Lighting equipment	222,311
Distribution system, underground	985,844
Distribution system, overhead	638,903
Telephone system	49,003
Equipment	4,987,100
Shop equipment	149,059
Construction equipment	150,015
Utility equipment	88,140
Furniture and fixtures	82,631
Miscellaneous equipment	40,003
Salem gas utility	238,866
Working capital	1,850,000
Water powers	4,767,750
Development cost	9,962,726

The reproduction cost new, including overhead, is placed at $40,361,988; and working capital for the development of waterpower at $16,580,476.

INDIANA LEGISLATURE

The following new bills have been introduced in the house: a bill amending the public utility law, providing that firemen in uniform may ride free on street cars; a bill providing a penalty of from $5 to $10, to which may be added ten days' imprisonment, for requiring stationary engineers to work more than fifty-six hours a week or more than eight hours a day unless to shorten the working hours of some other day; a bill requiring railroad and interurban railroads to cut weeds along the right-of-way; a bill providing that upon petition of ten freeholders boards of public works shall compel the fulfillment of franchise requirements as to extensions and improvements, and that on failure of the board to act the matter may be taken to court and the board of works and the corporation made joint defendants; a bill providing for a board of mediation and conciliation and for a board of arbitration in controversies between employers and employees.

House bill 346, requiring that street or interurban railroads place their tracks in the middle of the highways for a distance of 1 mile from the corporate limits of towns of 30,000 to 58,000 population, was killed in committee. House bill 110, providing a penalty for the destruction or interference with any fixed railroad signals or equipment, has passed the House.

The following new bills have been introduced in the Senate: a bill making it unlawful for any person to trespass upon the right-of-way of a railroad; a bill providing that any person, firm or corporation engaged in the business of transporting passengers for hire by automobile shall constitute a "public utility" and be subject to all the provisions of the utility commission act, and that such person, firm or corporation shall not engage in or continue in such business except under a license granted pursuant to an ordinance which must be passed by the municipality wherein such utility is operating, fixing the terms and conditions and providing for a satisfactory bond, the public service commission to have the right, on petition, to review and modify the terms of any such ordinance ("jitney bus" bill).

The following bills have passed the Senate: S. B. 329, giving the Public Service Commission the power to order separation of grade crossings in cities of 20,000 population or less; S.B. 316 amending the public utility commission act by extending the time for the taking of indeterminate permits by public service corporations; S.B. 318, amending the public utility commission act by permitting railroads to give passes to employees where such employees are holding public office.

CLEVELAND PROPERTY HOLDINGS

Replying to a resolution introduced in the City Council at Cleveland, Ohio, on Feb. 8, to the effect that the Cleveland Railway sell all its surplus lands, J. J. Stanley, president of the company, a day or two later said the company has no surplus lands. All the real estate now owned by it was being used. Later the land used for a carhouse and yards at Superior Avenue and East 105th Street would be placed on the market, but at present the property was being used. The new station at the end of the Superior Avenue line has not yet been completed.

This resolution followed the decision of the street railway committee to give its approval to the purchase of a tract of land at Denison Avenue and West Seventy-third Street, where the company will build an operating station. The negotiations for this land, about eighteen acres, were closed late in the week. The purchase price is $53,168. When the station has been completed at this point the Holmden Avenue carhouse will be abandoned and the land will probably be sold.

The arrangement proposed for West Madison Avenue, within the boundaries of Lakewood, is 3 cents within the boundaries of Lakewood and 5 cents from any point in Lakewood to any point within the city. It is argued that another step will bring the company to the zone system.

SUBWAY SHORT CIRCUITS

The Public Service Commission for the First District of New York continued during the week ended Feb. 20 its investigation into the subway accident of Jan. 6, when fire from a short circuit of the electric cables caused a serious interruption to traffic and the overcoming of many passengers by smoke, resulting in the death of one. A new phase was given the inquiry by testimony produced before the legislative investigating committee to the effect that workman employed by contractors for the new subway at Forty-second Street and Broadway had accidently driven a drill into the subway cable duct early in the morning of Jan. 6, when the short circuit and fire occurred. The inference drawn was that this act was responsible for the short-circuit which followed. The workmen in question were employed by the Holbrook, Cabot & Rollins Corporation, which has the contract for the connection between the existing subway and the new Seventh Avenue subway at Times Square. The commission took the testimony of these workmen, who described the manner in which the cable duct was penetrated by the drill. Engineers for the commission also gave testimony, which tended to show that the accident as described by these workmen could not have occurred, for the reason that the cable at the point in question was found to be intact after the accident of Jan. 6.

Another short circuit occurred in one of the electric cables of the subway in the tunnel under the East River on Feb. 15. Power was shut off and traffic to Brooklyn interrupted for a half hour from 10:50 p. m. There was no fire, but some smoke resulted and penetrated into the tunnel. As a matter of precaution the company shut off the power. The accident occurred in the eastbound tube, and there were no trains in it at the time or if any were passing when the short circuit occurred, they reached the Brooklyn side without interference. The cause of the short circuit has not been learned.

BAY STATE ARBITRATION

Arbitration hearings in the Bay State Street Railway wages case during the week ended Feb. 20 were occupied largely by testimony regarding living conditions in the homes of employees, features of daily routine and details of car operation. On Feb. 17 an adjournment of one day took place as a result of falsification of testimony by Daniel W. Cahill, a motorman. Upon being recalled to the stand the witness admitted prevarication, and Chairman Pelletier of the arbitration board administered a severe rebuke, declaring that the witness should be discharged from the company and expelled from the union. Mr. Pelletier pointed out that false evidence submitted relative to the underclothing of the witness' children in material made from flour bags had abused the sympathies of the public and had nullified the value of the testimony by the witness, who also failed to give accurate evidence in other particulars. Another witness was caught falsifying a few days ago. A meeting of the union conference committee was held at Boston on Feb. 18 to consider the situation.

The arbitration hearings were resumed on Feb. 24. Counsel James M. Swift read a statement from the company to the effect that it had decided to reinstate Conductor Henry A. Swartz on the ground that his discharge had tended to frighten other employees from giving testimony before the board, and that in order to preserve to the utmost the spirit of fair play the company had concluded to forego its undoubted right of discharge. Swartz had been reprimanded by Chairman Pelletier for falsification of testimony at a preceding hearing and had subsequently been discharged, following the expression of opinion by the chairman that such an employee was unfit to remain a member of the company's organization and ought to be dropped from the union. Chairman Pelletier also presented a statement pointing out the absolute necessity of good faith and serious effort in such arbitrations to the successful solution of labor problems and stated that every man from the highest labor leader to the most insignificant employee appearing as a witness should strive to carry on the proceedings in good faith and with all the seriousness of a trial before the highest court. Charles F. Bancroft, superintendent of motive power and machinery, testified that most shop employees had received wage increases of 17 per cent since 1910.

LEGISLATION IN NEW YORK

The Senate of New York on Feb. 22 passed the workmen's compensation commission appropriation bill, with its amendment providing for direct settlement of compensation claims between employers or their insurance carriers and injured workmen. The measure reached the Assembly on Feb. 24. After a discussion of two hours in caucus it was voted unanimously by the Republicans to strike out everything in the bill except the enacting clause and the section containing the provision for the appropriation to carry the commission through the fiscal year.

Among the bills introduced into the Legislature recently are the following: an act to amend the transportation corporations law in relation to motor vehicles carrying passengers for hire in certain cities of the first class; an act to amend the railroad law in relation to duty to furnish refrigerated cars for the shipment of perishable property; to amend the railroad law in relation to crews for engines in yard and terminal service; to extend the time for the completion of the New York Connecting Railroad bridge over the East River; to extend the time of the Westchester Northern Railroad to begin and finish the construction of its road and put it in operation and extending the corporate existence and powers of the company; to extend the time of the New York, Westchester & Boston Railway to finish the construction of its road and put it all in operation and extending the corporate existence and powers of the company; to amend the penal law in relation to certain railroad employees, including telephone operators, signalmen and towermen; to amend the railroad law in relation to powers of electric light and power corporations.

At the request of the Public Service Commission for the First District, the Legislature has passed an act amending the civil service law so as to permit the continuance of provisional appointments pending the establishment of eligible lists until July 1, 1915. The civil service law contemplates that provisional appointments, which are made in the absence of eligible lists, shall last for only two months, but the Public Service Commission has been compelled to make a number of such appointments in order to keep the rapid transit work going and on account of its failure to get eligible lists such appointments have lasted longer than the time mentioned. It is expected that eligible lists for various classes of employees will be provided in the near future, and the amendment will permit provisional appointees to serve until such lists are available.

PRESIDENT BANCROFT ON BOSTON TRANSPORTATION BILLS

Before the committee on metropolitan affairs of the Massachusetts Legislature on Feb. 19, William A. Bancroft, president of the Boston Elevated Railway, appeared in opposition to a group of about a dozen bills extending or altering the existing system of rapid transit. Several of the measures provided for the construction of a subway station at Arlington and Boylston Streets; others proposed the removal of the elevated structure in southern Washington Street and the construction of an equivalent subway, and the extension of the Dorchester tunnel to Codman Square from the terminus authorized at Andrew Square. General Bancroft discussed the growth of the system, its investment and earnings during the past eighteen years along lines which have been published in this journal and showed the need of the company's being given a financial breathing spell before undertaking any new rapid transit lines. He pointed out that probably no other city in the world had received so comprehensive a rapid transit development in the period from 1897 to 1915 as has Boston and said that the rapid transit lines in themselves were unprofitable, with the exception of the Tremont Street Subway and East Boston tunnel, which about "break even." The wages increase of two years ago was costing the company $500,000 a year more than before and the public was not paying the proper cost of transportation. General Bancroft quoted numerous figures showing that a substantial service was already rendered the Arlington Street district and stated that the institution of a new station would be of doubtful value to the community, apart from costing the company $46,000 a year to maintain, carry and operate with escalators. Closing, he urged that the rapid transit facilities authorized in 1911 and now under construction be completed and tested before further extensions of the system were added to the company's burdens. The hearing was closed.

EXTENSION OF SAN FRANCISCO MUNICIPAL RAILWAYS

The Church Street extension of the San Francisco (Cal.) Municipal Railway system has been approved after a fight between opposing factions that extended over many months and earned for the Church Street hill the name of "Battle Mountain." On Feb. 17 Mayor Rolph signed an order to start the construction of this branch according to the scheme known as plan No. 9 prepared by the city engineer. This plan provides for a deviation from Church Street through 2700 ft. of private right-of-way so as to avoid the heaviest grade, and is estimated to cost a total of about $505,000 if the city builds its own tracks parallel to the United Railroads' tracks on the Market Street portion of the line. It is not yet decided whether to parallel the United Railroads' tracks or to arrange for joint use. Of the total cost $305,000 is to cover all construction work exclusive of acquiring private right-of-way and making necessary excavation thereon. The total length of the branch from Van Ness Avenue to Thirtieth Street will be 13000-ft. (double track) of which 1135 ft. (double track) will have to be over United Railroads line regardless of whether their lines or new trackage is used on Market Street. The initial cost is to be lessened somewhat by the use of T-rail construction from Eighteenth to Twenty-second Streets. Of the original bond issue there is now available $325,000 which was set aside for the building of the Church Street branch. This is to be supplemented by other funds.

FEDERAL TRADE COMMISSION APPOINTMENTS

President Wilson on Feb. 22 sent to the Senate the nominations of the five members of the new Federal Trade Commission, as follows: Joseph E. Davies of Wisconsin, now Commissioner of Corporations, whose bureau the new commission will absorb, to serve seven years; Edward N. Hurley, president of the Illinois Manufacturers Association, to serve six years; William J. Harris of Georgia, now director of the Census, to serve five years; William H. Parry of Washington, treasurer of the Seattle Chamber of Commerce, to serve four years; George Rublee, a lawyer of New Hampshire, to serve three years. Mr. Davies, Mr. Hurley, and Mr. Harris are Democrats; Mr. Rublee is a Progressive, and Mr. Parry, while nominally a Republican, is regarded as a Progressive. The law creating the Federal Trade Commission was enacted five months ago. It requires that not more than three members of the commission shall be of any one political party.

Utility Bill Hearings Concluded.—The judiciary committee of the Utah Senate concluded on Feb. 14 the hearings on the bill to establish a public utility commission in that State. The committee is expected to report before March 1.

Mayor Harrison Defeated at Primaries.—At the mayoral primaries held in Chicago, Ill., on Feb. 23, Mayor Harrison was overwhelmingly defeated by Robert M. Sweitzer, another Democratic aspirant. An admitted factor in his defeat was his failure to put into effect his promises to improve transportation conditions.

Case Against Directors Dismissed.—The February Grand Jury at New York has dismissed without finding indictments the cases against T. P. Shonts, August Belmont and other members of the board of the Interborough Rapid Transit Company in connection with the accident on the elevated railway on Dec. 9. The cases were carried to the Grand Jury following the finding of the coroner's jury.

Decision Against Seattle Purchase.—The proposition for the purchase of the Seattle, Renton & Southern Railway by the city of Seattle, Wash., will not go on the ballot to be voted upon at the general municipal election to be held on March 2, the question of purchase having been indefinitely postponed at a recent meeting of the City Council Both the City Council and the receivers of the company declare that a favorable vote would bind neither the city nor the receivers, except in an advisory way.

The Lexington Dispute.—The Kentucky Traction & Terminal Company, Lexington, Ky., has declined to reinstate Robert Walker, the discharged motorman over whom the controversy with its men arose, and share the expense of the arbitration proceedings. The proposition was made by the union, which is said to be anxious to have the dispute settled. The complaint charges the company with discrimination, though the company insists Walker's accident record was sufficient to justify dismissal.

J. J. Sullivan on Advice Brokers.—Jeremiah J. Sullivan, president of the American Railways, Philadelphia, Pa., drew up on Feb. 22 a list of six "don'ts" for Secretary of State W. J. Bryan, to match the seven "don'ts" for bankers which Secretary Bryan advocated on Saturday night in a speech at a dinner in Washington of the American Institute of Banking. Mr. Sullivan said that everybody these days is offering advice and everybody seems to be a sort of an advice broker.

Utility Bills in Arkansas.—Bills are pending before the Legislature of Arkansas to extend the powers of the Railroad Commission to other public utilities and to abolish that commission and create a public service commission. At a recent hearing on the measures held before the judiciary committee of the Senate opposition to the bills was entered by the companies affected on the ground that both are detrimental to the best interests of the companies. The committee is expected to report by March 1.

New Franchise Desired in Henderson, Ky.—The Henderson (Ky.) Street Railway has asked the City Council for a new franchise, covering a period of twenty years from Oct. 16, 1916, when the present franchise will expire, and for which the company may be permitted to bid. It is set forth that the only way funds may be secured for repairs is through a bond issue, which could not be floated unless a new franchise was granted. The Mayor has appointed a committee to draw up a franchise and submit it to the Council.

Hatters Want Government to Pay.—Before the House committee on appropriations on Feb. 20, Judge Alton B. Parker, Samuel Gompers, and Frank Morrison, representing organized labor, asked that the item of $290,000 be placed in the general deficiency appropriation bill for the relief of the Danbury Hatters Union, which was held liable under a decision of the United States Supreme Court for heavy damages, caused by their violation of the Sherman anti-trust law. The committee postponed further consideration of the question.

Bills in Michigan.—A bill introduced in the Michigan Legislature to provide that motormen and conductors on street and electric railways shall not work in excess of ten hours in twelve is now before the committee on State affairs, which has heard representatives of the employees. A formal statement in reply to the claims of the union representatives is being prepared by the street railways for presentation to the committee. A bill has been introduced to provide for voluntary mediation and arbitration in labor disputes. It follows closely the voluntary arbitration act in force in Canada.

Access to Private Correspondence Denied to I. C. C.—The United States Supreme Court on Feb. 23 put strict limits upon the power of the Interstate Commerce Commission to search the private papers of railroads. The case arose in connection with the Louisville & Northern Railroad when the commission, in order to secure evidence regarding the alleged illegal use of passes, desired to examine the private correspondence and particularly the communications with counsel. The decision of the court holds that it was the expressed intention of the framers of the Interstate Commerce act to authorize examiners to call for only accounting records and memoranda.

Carhouse Destroyed. — The Westboro (Mass.) carhouse of the Boston & Worcester Street Railway was destroyed by fire on Feb. 18. The company lost ten modern double-truck cars valued at about $90,000, the total loss being about $140,000. According to E. P. Shaw, Jr., general manager, the fire started in a car heater and spread to adjacent rolling stock before the arrival of the Westboro fire department after a 3-mile run. A motorman who was in the building at the time succeeded in getting out a box car and a snow plow. The carhouse was a 300-ft. by 100-ft. brick building with an adjoining substation. The latter was saved and service on the Worcester-Westboro end of the line was well maintained.

Steel for Brooklyn Third Tracking.—The Public Service Commission for the First District of New York has approved plans and form of contract submitted by the New York Municipal Railway Corporation for the furnishing of structural steel to strengthen and widen the existing elevated structure to provide for a third-track on the Broadway line, Brooklyn, from a point near Myrtle Avenue to a point near Aberdeen Street. The company was directed to submit the contract to open competitive bidding. The contract calls for the delivery of the steel to begin sixty days from the date of the contract and to be completed within six months from that date. The company has already purchased the steel and let the contract for the third-track on the Broadway line from Havemeyer Street to Myrtle Avenue.

Legislative Trend in Maine.—Among the measures introduced in the Maine Legislature is one compelling electric cars to be equipped with fenders; fixing the hours of motormen and conductors as nine within eleven consecutive hours; compelling every electric car to come to a full stop at least once in every mile to allow the passenger to board or leave the car; authorizing the Norway & Paris Street Railway to purchase or lease the property of the Mechanic Falls Electric Light Company; extending the charter of the Rockland, South Thomaston & St. George Railway for two years. Edward Clark has asked for an extension of the charter of the Skowhegan & Fairfield Electric Railroad, it being the intention to complete the line from Skowhegan to connect with another system at Shawmut. The distance it is intended to build is about 10 miles.

Railway Number of Meco News.—The issue of *Meco News* for February, published by the Metropolitan Electric Company Section of Reading, Pa., of the National Electric Light Association and the Reading Transit & Light Company, is a special railway number, containing sixty-eight pages. The frontispiece is a likeness of Norman McD. Crawford, president of the companies. Among the features are an article "A Day in Court," by R. D. Billings, claim agent of the company; "Service Not First but Always," by S. E. Smith, general superintendent of railways; "Rail Joints and Bonds," by H. H. Kamm of the engineering department; "Retrospection," by Bessie Detweiler, in which the history of the constituent companies is traced briefly from the inception of railway work in Reading in April, 1873, by the Penn Street Passenger Railway; "Controllers," by William K. Loos, division superintendent.

Brooklyn Rapid Transit Insurance.—Rates on the $22,600,000 of Brooklyn (N. Y.) Rapid Transit Company insurance have been reached. The rate on the buildings and contents is 44.4 cents and on the rolling stock of the company 22 cents. This is an average rate of 76.15 cents for three years, while the previous average rate was 34.7 cents for one year, or an average three-year rate of 86.75 cents. The Brooklyn Rapid Transit insurance has been carried on open binders by the insurance companies since early in December, awaiting the determination of a rate. Lloyds of London, it is believed, got the Brooklyn Rapid Transit insurance at the rate of 34.7 cents per annum, and through a special arrangement the rate was slightly shaded below this figure. The reason for giving the insurance to Lloyds of London was that the rate had been increased from 34.7 cents per annum to 63.2 cents per annum by the Fire Insurance Exchange. The latter has now, however, issued a rating as above, which is acceptable to the Brooklyn Rapid Transit Company.

National Electrical Week Plans.—At a meeting of the board of directors of the Society for Electrical Development, Inc., held in New York on Feb. 17, the principal matter under discussion was the plan for a national electrical week. The board unanimously approved the plans of the committee, and it was decided to go ahead with the plans for an electrical week. Many of those present were in favor of a week early in the spring of 1916, as it was felt that this would afford a good opportunity to reap a substantial benefit. The matter was referred to a committee to be appointed by the president. The general manager's and the treasurer's reports showed the society to be in a very satisfactory financial condition. A very small percentage of the membership had resigned while many members had paid their subscriptions for the first half of 1915, and new members were continually joining. The matter of employing a resident representative of the society on the Pacific Coast was referred to the president and the general manager of the society with power to act. James Smieton, Jr., who has been acting for the society as its secretary-treasurer for the past year, has been appointed to that office.

PROGRAM OF ASSOCIATION MEETING

New England Street Railway Club

The fifteenth annual meeting and dinner of the New England Street Railway Club will be held at the Copley-Plaza Hotel, Boston, Mass., on March 25. The annual meeting will be at 3 p. m., the reception at 6 p. m., and the dinner at 6:30 p. m. Following the dinner there will be speeches, music and entertainment. The change to the Copley-Plaza Hotel will make it possible to accommodate a larger number of people and the arrangement which will be followed there as to seating will permit freer movement among the tables and it is believed will facilitate the social side of the meeting. The tickets are $4 each. The majority of the tables will seat ten persons. A limited number of tables each seating six persons has been provided and will be assigned to those especially requesting them in the order in which such applications are received. Members will be permitted to purchase as many tickets for guests as they may desire.

Financial and Corporate

CORPORATE CHANGES IN UTAH

Utah Securities Corporation Through Operating Subsidiary, the Utah Power & Light Company, Takes Over Properties in Salt Lake City and Ogden

Official announcement has been made by the Utah Securities Corporation that its subsidiary, the Utah Power & Light Company, has formally taken over the electric light and power and street-railway properties in Salt Lake City and the electric light and power and gas properties in Ogden, Utah, heretofore controlled by the Oregon Short Line Railroad and now owned by the Utah Light & Traction Company. The Utah Power & Light Company owns all the stock of the Utah Light & Traction Company, except directors shares. The process by which the Utah Light & Traction Company succeeded the former Utah Light & Railway Company was fully described in the ELECTRIC RAILWAY JOURNAL of Sept. 12, Sept. 26 and Oct. 10, 1914.

The Utah Power & Light Company, in addition to owning all the stock of the Utah Light & Traction Company, has leased for ninety-nine years from Jan. 1, 1915, the electric light and power and gas properties of that company, and, therefore, earnings of the Utah Power & Light Company from Jan. 1, 1915, will include income from these leased properties. The electric railway property of the Utah Light & Traction Company in Salt Lake City and vicinity will continue to be operated directly by it, and its surplus earnings will accrue to the Utah Power & Light Company through the stock ownership.

The gross earnings of the Utah Light & Traction Company for the year ended Dec. 31, 1914, were $2,769,835, and the net earnings, after depreciation and taxes, $868,190. The annual interest charge on all outstanding bonds is $762,670. It is expected that the consolidation of the electric light and power systems of the Utah Light & Traction Company with those of the Utah Power & Light Company will effect material economies.

C. W. Whitley has been elected president of the Utah Light & Traction Company, with H. L. Beach manager and Joseph S. Wells secretary and treasurer. The board of directors, as chosen at a recent stockholders meeting, is made up as follows: C. W. Whitley, Joseph Scowcroft, D. C. Jackling, O. J. Salisbury, C. E. Groesbeck, Lawrence Greene, J. Frank Judge, E. O. Howard, R. C. Gemmell, S. A. Whitney, J. M. Bidwell and Joseph S. Wells.

In connection with the present outlook confronting the new arrangement of companies, C. E. Groesbeck, vice-president and general manager Utah Power & Light Company, says:

"My observations of business conditions throughout the territory we serve in three states, Utah, Idaho and Colorado, impress me that the ensuing year will develop a substantial, steady gain in practically all lines of business. Salt Lake and Ogden are two of the best and livest cities in the entire country, and 1915 should bring a large share of prosperity to both."

NORTHERN ELECTRIC RAILWAY FINANCES

The chairman of the bankers' committee of the Northern Electric Railway has mailed a second circular letter to security holders, urging them to sign the several agreements for the refinancing of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 9. Four subsidiaries of the Northern Electric Railway on Feb. 16 filed a petition in the United States District Court asking to be included in the receivership. The purpose of the petition is to have the financial tangle worked out as one system, the management of all the concerns being the same. The corporations joining in the petition are the Northern Realty Company, Sacramento & Woodland Railway, Sacramento Terminal Company, and Northern Electric Railway, Marysville and Colusa branch. The reorganization plan of the company is said to be progressing smoothly, and the subsidiary receiverships would only save a multiplicity of proceedings that would defer a final complete settlement.

ANNUAL REPORTS

California Railway & Power Company

The statement of income, profit and loss of the California Railway & Power Company, San Francisco, Cal., for the period from Dec. 18, 1912, to June 30, 1914, follows:

Income:	
Dividends on stocks owned	$605,000
Interest on notes and accounts receivable, etc	220,419
Interest on bank balances	4,482
Total	$829,901
Expenses:	
Salaries	$2,355
Taxes	7,741
Transfer agent's, registrar's fees, etc	2,301
Directors' fees and expenses	1,602
Legal	529
Stationery, printing and postage	488
Traveling	1,982
Organization—portion charged off	937
General	3,232
Total	$21,167
Net income	$808,734
Dividends:	
On prior preference stock	$314,705
On preferred stock	378,092
Total	$692,797
Profit and loss surplus, June 30, 1914	$115,937

The foregoing statement is taken from the first annual report of the company since its incorporation on Dec. 18, 1912. This holding company controls the United Railroads of San Francisco, the Sierra & San Francisco Power Company, the Coast Valleys Gas & Electric Company and the San Francisco Electric Railway, and is itself controlled by the United Railways Investment Company. A comparison between the company's income for the twelve months ended June 30, 1914, and any subsequent similar period can be made by deducting from the figures given above the amounts for the period from Dec. 18, 1912, to June 30, 1913, as follows: Income, $129,909; expenses, $1,884; net income, $128,025; dividends on prior preference stock, $108,205, and surplus on June 30, 1913, $19,819.

The statement of income, profit and loss of the United Railroads of San Francisco for the year ended June 30, 1914, follows:

Gross earnings:	
Passenger	$8,450,725
Advertising	56,000
Total	$8,506,725
Operating expenses and taxes:	
Maintenance of way and structure	$624,097
Maintenance of equipment	454,222
Transportation expenses	3,042,640
General expenses	601,778
Total operating expenses	$4,722,737
Taxes	503,800
Total operating expenses and taxes	$5,226,537
Net earnings	$3,280,188
Other income:	
Sinking fund earnings	$116,851
Interest and discount	26,477
Interest bond investments	29,608
Rentals	3,232
Miscellaneous earnings	9,469
Total	$185,637
Gross income	$3,465,825
Current income charges	422,824
Net income before bond interest charges	$3,043,001
Bond interest:	
United Railroads' bonds	$954,160
Underlying bonds	690,550
Total	$1,644,710
Net income	$1,398,291
Surplus at beginning of period	462,139
Profit and loss credits	306,403
Total	$2,166,833
Profit and loss charges	1,148,200
Profit and loss—surplus June 30, 1914	$1,018,633

Jesse W. Lilienthal, president of the company, states that while the general dullness of trade and some competition on the part of the municipal lines in San Francisco temporarily affected the earnings of the United Railroads, it is expected that these will be materially stimulated by the attendance at the Panama-Pacific Exposition and by the growth of the city following the completion of the Panama Canal. The operating ratio for the fiscal year was 55.52 per cent. The ratio of taxes to gross earnings was 5.92 per cent. The ratio of operating expenses and taxes to gross earnings was 61.44 per cent. The company now has 260.02 miles of electric track and 14.7 miles of cable track, or a total of 274.72 miles. It has 760 revenue cars and a total of 836 cars. During the last year the company purchased and put into operation sixty-five new cars and reconstructed twenty-five more. Every revenue car is thoroughly overhauled once every thirteen months. A statement of income, profit and loss of the United Railroads for the period of approximately nine years from Jan. 1, 1906, to June 30, 1914, was printed in the Electric Railway Journal of Sept. 5, 1914.

The Sierra & San Francisco Power Company showed an increase of 13.2 per cent in gross earnings for the year and an increase of 13.4 per cent in operating expenses and taxes, including depreciation, giving an increase of 13 per cent in net earnings. Bond interest and uncollectible accounts increased 4.3 per cent, so that the net income applicable to investment increased 29 per cent. The rate of growth of the company's business reflects largely the growth of the business outside of San Francisco, this having increased for the year 23.4 per cent as compared to an increase of 8.56 per cent within San Francisco. The gross earnings of the Coast Valleys Gas & Electric Company increased 16.8 per cent., while the operating expenses, including taxes and depreciation, increased 20.6 per cent. The net earnings, therefore, increased 11.1 per cent, which with increased deductions of 18.9 per cent made a decrease in net income of 2.3 per cent.

Detroit United Railway

The statement of income, profit and loss of the Detroit (Mich.) United Railway for the fiscal year ended Dec. 31, 1914, follows:

	1914	1913
Passenger earnings	$11,464,626	$11,952,286
Express earnings	717,129	708,473
Mail earnings	11,979	12,031
Special car earnings	46,270	51,038
Gross earnings from operation	$12,240,004	$12,723,828
Operating expenses	8,702,660	8,694,230
Net earnings from operation	$3,537,344	$4,029,598
Income from other sources	273,728	251,937
Gross income less operating expenses	$3,811,072	$4,281,535
Deductions:		
Interest on funded and floating debt and taxes:		
Detroit United Railway	$1,525,954	$1,553,133
Rapid Railway System	178,648	168,098
Sandwich, Windsor & Amherstburg Railway	37,942	37,534
Detroit, Monroe & Toledo Short Line Railway	199,130	168,633
Detroit, Jackson & Chicago Railway	224,397	233,660
Total interest and taxes	$2,166,072	$2,151,058
Credited to depreciation reserve	294,000	500,000
Credited to contingent liability reserve	50,000	100,000
Dividends	750,000	750,000
Total deductions	$3,260,072	$3,501,058
Net income to surplus	$551,000	$780,477

During the year the gross earnings from operation decreased $483,824, or 3.9 per cent. This decrease was made up of a slight decrease in mail and special car earnings, an increase of $8,656, or 1.2 per cent, in express earnings, and a decrease of $487,630, or 4.08 per cent, in passenger earnings. The operating expenses increased $8,430, or 0.09 per cent, but the income from other sources also increased, to the amount of $21,791, or 8.6 per cent, so that the gross income decreased $470,463, or 10.9 per cent. The interest charges and taxes increased $15,014, or 0.69 per cent, but only $294,000 and $50,000 were credited to the depreciation and contingent liability reserves, respectively, as compared to $500,000 and $100,000 for the previous year. The total deductions, therefore, decreased $240,986, or 6.8 per cent, and the net income to surplus decreased $229,477.

The record of passengers carried during the year showed the following figures: Revenue passengers, 252,961,221; transfer passengers, 85,354,131; employees, 7,865,048; total

passengers carried, 346,180,400. This was slightly less than a 7 per cent increase, as compared to an increase of more than 16 per cent in 1913 over 1912. Within the one-fare zone the decrease in revenue from fares amounted to $585,-741, although within the same zone there was an increase of nearly 21,000,000 in the number of passengers carried. The receipts per revenue passenger were $0.0453 and per passenger $0.0331. The total car mileage was 44,882,720 car miles, the earnings per car mile $0.2727, the expenses per car mile $0.1939, and the net earnings per car mile $0.0788.

The depreciation reserve on Dec. 31, 1914, was credited with $2,703,627 as compared to $2,483,627 at the beginning of the year. During the twelve months the company spent the following amounts on capital account: Detroit United Railway, $917,597; Rapid Railway, $87,071; Detroit, Monroe & Toledo Short Line Railway, $48,926; Detroit, Jackson & Chicago Railway, $3,982, and Sandwich, Windsor & Amherstburg Railway, $110,577. The company also expended $103,432 in connection with the State and city appraisals, of which amount $61,000 was charged to the contingent liability reserve and the balance to the operation account. The balance in this reserve on Dec. 31, 1914, was $589,000.

The total mileage of the company, including side and yard tracks, was on Dec. 31, 1914, 820.63 miles, 18 miles having been added during the last year. The company's rolling stock consists of 1403 closed passenger cars, 263 open passenger cars, 247 freight and construction cars, 36 line cars, 84 express cars, 16 miscellaneous cars, 2 locomotives, 3862 motors and 3057 trucks. There are eleven power houses with a combined capacity of 67,290 hp, two storage batteries with a combined capacity of 4500 amperes, and eighteen substations with a combined capacity of 18,900 kw.

CO-RECEIVERSHIP IN BIRMINGHAM

Independent Bondholders' Committee Through Court Decision Wins Fight for Appointment of Co-Receiver

S. H. Cunningham, chairman of the independent bondholders' committee for the first mortgage thirty-year 5 per cent bonds of the Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala., has announced that the Federal Court for the Northern District of Alabama has entered a decree appointing Augustus Benners, a Birmingham attorney, as co-receiver for the company to act with I. W. Ross.

Mr. Cunningham, with certain stockholders, recently petitioned the court for the appointment of a co-receiver to bring suit for an accounting from Morris Brothers, Philadelphia, who promoted the railway, expecting such minority stockholders as might take part to bear the expense of such proceedings if necessary. The co-receiver, however, was empowered by the court to examine the facts and report as to the prosecution of this suit at the expense of the estate. If he should not so recommend, the court has intimated that the suit may be carried on for the benefit of the railway at the expense of the stockholders.

Mr. Cunningham states that the contemplated action will probably call on promoters for the return of bonds or funds in excess of $500,000, together with such damages as have accrued to the railway through the failure of the promoters to complete the property. The independent bondholders' committee will offer every aid to the new receiver in investigating this claim, including the reports of its experts.

Foreclosure proceedings were recently instituted at the expense of the majority committee and the co-receivership is extended over the foreclosure suit. Previous references to the finances of this company were made in the ELECTRIC RAILWAY JOURNAL of Sept. 12 and 26, Oct. 3 and 24, Nov. 14, and Dec. 5 and 19, 1914.

Barcelona Traction, Light & Power Company, Barcelona, Spain.—As a result of the announcement that the Barcelona Traction, Light & Power Company would be unable to meet on Dec. 1 the half-yearly coupons on its £7,500,000 of 5 per cent first mortgage bonds, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 12, a committee has been formed in the interests of the bondholders to confer with the company in respect to a financial readjustment. At the time of deferring the interest, the directors stated that they had under consideration a plan for providing the company with the necessary funds for continuing construction and for the adjustment of the maturing interest. The new committee is expected to arrange for a meeting of the bondholders, at which it is hoped the directors will be able to present proposals for the refinancing.

Cape Electric Tramways, Ltd., Cape Town, South Africa.—The report of the Cape Electric Tramways, Ltd., shows that during the year ended June 30, 1914, the company made a profit of £78,866, and after providing for debenture interest, redemption of debentures, and the balance from the previous year, there was a net credit balance of £32,617. From this amount the reserve fund was credited with £8,000, leaving a balance of £24,617. In Cape Town the tramways carried 16,576,992 passengers, earning £155,472, as compared to 14,779,709 passengers, earning £144,221, in 1913. In Port Elizabeth the result of the operations showed 4,309,154 passengers, earning £44,936, as compared to 4,155,-711 passengers, earning £43,035, in 1913. The report states that the tramway receipts showed satisfactory advances, but on account of increased maintenance cost and taxes the net profits decreased. On account of serious financial and trading conditions brought about by the European war, the directors decided to recommend the declaration of a dividend of only 2½ per cent.

Columbus Railway & Light Company, Columbus, Ohio.—The directors of the Columbus Railway & Light Company have declared a dividend of 75 cents a share on the capital stock, payable Feb. 25. No dividend, however, will be paid to holders of stock who are in default of assessments due on Dec. 30, 1913, or on June 30, 1914, but the dividend instead will be applied on the assessments as of Feb. 25.

Dallas Electric Company, Dallas, Tex.—Perry, Coffin & Burr, New York, are offering at 97½ and interest, to yield more than 5.4 per cent, $150,000 of first mortgage (closed) collateral trust 5 per cent bonds of the Dallas Electric Corporation, due on April 1, 1922. The Dallas Electric Company, which is the successor of the Dallas Electric Corporation, controls practically all the street railway, lighting and power business in Dallas.

Fairmount Park Transportation Company, Philadelphia, Pa.—Under the present plan of reorganization for the Fairmount Park Transportation Company, an assessment of $3.50 per share is proposed to provide $70,000 required to meet the floating debt of $26,149, improvements to plant to cost $7,000, interest and sinking fund payments on the first mortgage bonds of $31,750 and about $5,000 of organization expenses for the new company to be formed. The present capital stock will be reduced from $2,000,000, of which $1,750,000 is now outstanding, to $500,000 in the new company. Of the new stock, $100,000 will be 7 per cent preferred, cumulative after Jan. 1, 1916, and $400,000 common, par value $10. The first mortgage bonds will not be disturbed. Those who subscribe to the new company will receive one share of preferred stock and five shares of common stock, a total of $60 par value, for each $10 paid. At present holders of about 24,500 shares of stock, out of 40,000, have notified the committee that they would agree to the plan. The reorganization committee consists of P. E. Foerderer, C. J. Jones, A. C. Gibson, W. L. Chrisman and S. M. Clements, Jr. A preliminary reference to the reorganization of this company appeared in the ELECTRIC RAILWAY JOURNAL of Jan. 16.

Fresno (Cal.) Interurban Railway.—The Railroad Commission of California has denied the application of the Fresno Interurban Railway, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 2, to issue twenty shares of capital stock to be sold at 80 and $14,700 of ten-year 6 per cent bonds to be sold at 90 for the purpose of providing funds for the purchase of equipment and for the payment of certain engineering, administration, legal and contingent costs. It appears on examination that such items were properly taken care of in the original authorization of securities and that an additional issue is not necessary at present.

Humboldt Transit Company, Eureka, Cal.—The Railroad Commission of California has authorized the Humboldt Transit Company to issue and pledge $18,000 of first mortgage 5 per cent sinking fund thirty-year gold bonds to the Pacific Coast Casualty Company as surety for a bond covering a stay of execution in a damage case. Previous ref-

erence to this application was made in the Electric Railway Journal of Jan. 30.

International Railway, Buffalo, N. Y.—Harris, Forbes & Company, New York; N. W. Harris & Company, Boston, and Harris Trust & Savings Bank, Chicago, are offering at 92½ and interest a block of $600,000 of refunding and improvement 5 per cent gold bonds of the International Railway, dated Nov. 1, 1912, and due on Nov. 1, 1962. These bonds are coupon in type for $1,000 denomination and registered for $1,000 and multiple denominations, and are callable at 110 and interest on any interest date. Including the present block, there are now outstanding $11,156,000 of an authorized issue of $60,000,000, of which $11,662,500 are reserved to retire divisional bonds. The bonds are secured by a direct mortgage on the entire property of the company, subject to the divisional bonds. The mortgage contains provision for a sinking fund whereby, commencing with 1912, annual sums will be set aside sufficient by July, 1949, to retire all except $640,500 of the divisional bonds. The refunding and improvement bonds will then be secured by a first mortgage on the entire property of the company, except a small amount of suburban mileage covered by the $640,500 of divisional bonds before mentioned. For the year ended Dec. 31, 1914, net earnings were more than twice the bond interest.

Middle West Utilities Company, Chicago, Ill.—The Illinois Trust & Savings Bank, Russell, Brewster & Company and others in Chicago and a syndicate formed by A. H. Bickmore and associates in New York are offering an issue of $500,000 of 6 per cent ten-year collateral gold bonds of the Middle West Utilities Company, dated Jan. 1, 1915. The bonds are sold to yield 6.75 per cent. These bonds are secured by the pledge of mortgage bonds on property of subsidiary companies owned entirely or controlled by the Middle West Utilities Company. President Insull states that companies whose bonds are pledged for this issue show an average ratio of net earnings to bond interest of 1.6.

Montreal Tramways & Power Company, Montreal, Que.—It is announced that Potter, Choate & Prentice have purchased $7,000,000 of two-year 6 per cent collateral trust gold notes, to be dated April 1, from the Montreal Tramways & Power Company. These notes are issued to refund $1,350,000 of notes which came due on Jan. 1, and which were secured by bonds of the Canadian Light & Power Company, and also to refund $5,000,000 of 6 per cent notes coming due on April 1, the additional amount of new notes being issued for various corporate purposes. It is reported that a large portion of the notes has already been placed privately, and that any offer of exchange to the old holders must be limited in amount. The notes will be callable in one year, April 1, 1916, at the option of the company at par and interest, on sitxy days' notice.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The committee selected to prepare a new financial plan for the Oakland, Antioch & Eastern Railway consists of Osgood Hooker, A. Christeson, J. J. Mahony, Philip Bancroft, John Lawson, L. S. Bachman and Fred H. Beaver.

Pacific Gas & Electric Company, San Francisco, Cal.—The Railroad Commission of California has authorized the Pacific Gas & Electric Company to issue $4,000,000 of 5 per cent one-year gold notes dated Dec. 15, 1914, these bonds being covered by a trust agreement to F. N. B. Close, trustee, and secured by collateral consisting of $5,000,000 of convertible general lien bonds, series A, and $5,000,000 of general and refunding mortgage gold bonds, series A. The application for these notes and the sale thereof were noted in the Electric Railway Journal of Jan. 16, Jan. 23 and Jan. 30.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—The Stockton Terminal & Eastern Railroad, operating between Stockton and Bolleta, San Joaquin County, on Feb. 18, filed an application with the Railroad Commission of California requesting authority to issue $319,500 of bonds to be used in completing its line to Jenny Lind, Calaveras County.

Stockton (Cal.) Electric Railroad.—The official headquarters of the Stockton Electric Railroad have been moved from Los Angeles to San Francisco.

Third Avenue Railway, New York, N. Y.—At a meeting of the directors of the Third Avenue Railway on Feb. 23, Lyon F. Strauss and Edwin M. Burghart were elected directors to succeed F. L. Babcock and M. Furgeson, resigned. Mr. Strauss represents the committee of stockholders which recently investigated the affairs of the company and recommended a dividend payment, as noted in the Electric Railway Journal of Feb. 6. Mr. Burghart represents the George Ehret Estate. It is reported that the question of the dividend was not raised at the meeting of the directors, and that no dividend will be thought of for at least six months.

DIVIDENDS DECLARED

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¾ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE.

Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Dec.,	'14	$65,509	*$29,753	$35,756	$17,462	$18,294
1 " "	'13	65,645	*30,726	34,919	17,354	17,565
12 " "	'14	777,752	*375,219	402,533	209,118	193,415
12 " "	'13	764,085	*346,512	417,573	207,584	209,989

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Dec.,	'14	$89,012	*$66,141	$22,871	$29,337	$6,466
1 " "	'13	100,378	*60,774	39,604	26,114	13,490
12 " "	'14	1,085,096	*699,723	385,373	339,409	45,964
12 " "	'13	1,204,928	*717,625	487,303	298,082	189,221

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., Dec.,	'14	$1,341,385	*$666,266	$675,119	$372,263	$302,856
1 " "	'13	1,349,191	*726,726	622,465	336,308	286,157
12 " "	'14	14,006,484	*7,549,898	6,456,586	4,212,852	2,243,734
12 " "	'13	13,669,321	*7,678,891	5,990,430	3,864,853	2,125,577

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m., Dec.,	'14	$203,510	*$124,269	$79,241	$62,523	$16,718
1 " "	'13	205,547	*116,063	89,484	63,576	25,908
12 " "	'14	2,513,620	$1,457,020	1,056,600	758,859	297,741
12 " "	'13	2,354,797	*1,312,873	1,041,924	714,273	327,651

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Dec.,	'14	$213,997	*$108,860	$105,137	$71,748	$33,389
1 " "	'13	238,628	*142,954	95,674	46,652	49,022
12 " "	'14	2,623,827	*1,616,214	1,007,613	701,949	305,664
12 " "	'13	2,700,966	*1,604,403	1,096,563	589,134	507,429

GRAND RAPIDS (MICH.) RAILWAY.

1m., Dec.,	'14	$125,913	*$64,732	$61,181	$12,162	$49,019
1 " "	'13	122,461	*72,321	50,140	12,421	37,719
12 " "	'14	1,286,568	*829,637	456,931	161,778	295,153
12 " "	'13	1,301,403	*803,607	497,796	166,633	331,163

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

1m., Dec.,	'14	$50,073	*$38,657	$11,416	$15,634	†$4,218
1 " "	'13	50,420	*37,118	13,302	15,338	†2,036
12 " "	'14	676,922	*467,809	209,113	186,417	22,696
12 " "	'13	675,554	*427,715	247,839	179,575	68,264

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Dec.,	'14	$197,273	*$109,647	$87,631	$31,079	$56,552
1 " "	'13	197,893	*110,183	87,710	39,928	47,782
12 " "	'14	2,240,308	*1,352,324	887,984	499,671	388,313
12 " "	'13	2,207,246	*1,339,019	868,227	464,235	403,992

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY.

1m., Jan.,	'15	$1,998,396	$1,173,758	$824,637	$812,414	$12,224
1 " "	'14	2,006,527	1,202,056	804,471	802,682	1,789
7 " "	'15	13,943,518	8,072,479	5,871,040	5,660,369	210,671
7 " "	'14	14,246,065	8,338,091	5,907,974	5,598,842	309,132

PORTLAND (MAINE) RAILROAD.

1m., Dec.,	'14	$81,058	*$53,318	$27,740	$21,332	$6,408
1 " "	'13	79,867	*51,057	28,810	23,498	5,312
12 " "	'14	1,044,842	*647,241	397,601	250,604	146,997
12 " "	'13	1,036,316	*689,476	346,840	180,881	165,959

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Dec.,	'14	$514,493	*$255,483	$259,010	$182,974	$76,036
1 " "	'13	607,476	*275,872	331,604	175,483	156,121
12 " "	'14	6,273,171	*3,263,883	3,009,288	2,172,678	836,610
12 " "	'13	6,723,742	*3,298,310	3,425,432	2,008,602	1,416,830

*Includes taxes. †Deficit.

Traffic and Transportation

DECISION IN ROCHESTER FARE CASE

Three-Cent Fare in Rush Hours Denied by Public Service Commission

The Public Service Commission of the Second District of New York in an opinion by Commissioner Martin S. Decker holds that on the case as submitted it is bound by law to dismiss the complaint of the city of Rochester asking for a 3-cent fare during rush hours on the New York State Railways lines in the Rochester 5-cent fare zone. For this case both parties agreed to accept the tax valuation of $10,791,124 as the amount on which the company is entitled to return in the Rochester 5-cent fare zone, and the commission finds that a fare reduction to 3 cents during rush hours would bring the company a return of only 4.55 per cent. This rate of return is held, in accordance with ruling cases in the courts, to be below the fair rate which the company is entitled to earn.

It was argued that increased business resulting from the 3-cent fare would reimburse the company for the cut from 5 cents. The commission finds that such an increase would have to amount to 20 per cent of the business of the last year. This increase would have to take place at the time of day when the system is already taxed to its capacity, and the opinion of Commissioner Decker says that it is "far beyond any increased net revenue which can upon any broad estimate be safely contemplated." The case is the first application that the commission has had for a 3-cent fare. The grounds of the complaint were that the reduction, which it was alleged the company could afford to make, would encourage the large working population of Rochester to establish homes away from the congested business centers.

The commission says that it must assume that the rate complained of is not unreasonable unless it shall appear that the company's revenue from Rochester traffic is so greatly in excess of a fair return that the reduction as demanded in the complaint would be fair and reasonable and is required in the public interest. It appears from the opinion of Commissioner Decker that the proposed reduction would reduce the company's revenue as for the year ended June 30, 1914, $434,459, and that the company would have left a remainder of revenue, after paying operating expenses and taxes of $491,660. Such remaining revenue applied to the valuation of $10,791,124, which was accepted by agreement of the parties, would give the company a return of 4.55 per cent. This rate of return is held, in accordance with ruling cases, to be below the fair rate which the respondent company is entitled to earn.

The company claimed that certain large amounts should be deducted from its revenue from operation in the Rochester 5-cent fare zone for that year, which were first stated in the case to be $1,033,658. The items so claimed to have been omitted by the company were: first, $19,031, for rental of subway containing wires carrying current to its lines; second, accrued accident and damage liabilities for the year $108,209; third, wages increased as the result of an arbitration award made while the hearings were in progress and which dates back to part of the year ended June 30, 1914, $48,506. The commission allows the first and third items, and reduces the second item to $40,000. The company also claimed a reduction for extraordinary renewals and replacements, the claim amounting in the maximum to $218,194. The commission does not pass upon this item and excludes it in its determination. The total reduction from income on account of the above stated omitted expense item is $107,537.

The commission also finds that if the increase of wages is excluded from consideration the net operating income would be $974,626, and after deducting the reduction which would be caused by lowering the fare in the rush hours from 5 cents to 3 cents the amount remaining would be $540,167, and that this sum would be 5 per cent upon the agreed valuation. It is found by the commission upon report of its electrical engineer that the company's expense for electric power in Rochester is not excessive as compared with the price paid for street railway power in Buffalo or Syracuse.

The commission discusses the question whether there would be such an increase of net revenue from the operation of the reduced rate as would cause the net revenue to reach a fair return upon the agreed valuation. Assuming the increase of net revenue must be 2 per cent in order to reach a fair return upon the agreed valuation the commission holds that this would be equal to $215,822, this being more than a 20 per cent increase on the entire net revenue for the year ended June 30, 1914, exclusive of any deductions for omitted items. The commission say that such 20 per cent increase in net revenue must come from an increase of persons riding due to the 3-cent fare during the busiest hours of the day when the present car capacity is most heavily taxed, and new travel to bring in such net revenue increase must be sufficient to pay for the operation of the required additional cars properly to accommodate all passengers during the rush hours. Of this Mr. Decker's opinion says:

"In all cases the effect of a reduced passenger rate upon traffic is largely speculative. In this case the reduced fare would not fill empty or partly empty operated cars, for it is within our general knowledge that Rochester cars during the rush hour periods, as in most of the large cities, are all fairly and we think fully required to meet present demands. We cannot assume from these considerations that the 3-cent fare as applied to rush hour travel would bring up the net revenue to any such extent as under the figures guiding us here must result in order to warrant the reduction sought upon this complaint. If the difference were small we might find that some increase of net revenue would result. This large deficit, amounting to as much as 20 per cent of the 1914 revenue from operation and 2 per cent of the agreed valuation, is far beyond any increased net revenue which can upon any broad estimate be safely contemplated as a probable result of the proposed decrease of fare."

Referring to the valuation of $10,791,124 as having been agreed upon by the parties themselves for the purpose of the case the commission says:

"It follows that we have here, as covering valuation of property, an 'agreed case,' as by and between the parties, and therefore one, concerning that branch of the case, in which there is no room for further inquiry and no basis for stating objections concerning any part of such valuation, however pertinent and forceful in an open case involving valuations such objections might be."

The commission points out that, unlike most other carriers' rate cases, there were no preliminary considerations by which to determine whether the 5-cent rate of fare was in and of itself or as applied to the community in general unreasonable or unjust, and calls attention to the following facts: The rate complained of has not been advanced; the rate has been long in force; it applies throughout the whole city and takes in all line extensions which may be made from time to time throughout the city; the 5-cent rate itself is a maximum charge fixed by the Legislature; it is the common street car rate of fare throughout the entire State and all cities and other municipalities; there have not been shown to exist in Rochester any special or peculiar conditions affecting actual travel which do not obtain in other large cities such as Buffalo, Syracuse, Utica or Albany, certainly none that create any sharp distinctions.

The real question for determination in this case was whether the respondent's total revenue from its operations within the Rochester 5-cent fare zone was excessive to the extent that the proposed reduction in fare from 5 cents to 3 cents during the week day rush hours was fairly justified and required. For the reasons above stated the commission found that the reduction asked for in the complaint would reduce the company's return upon the agreed valuation below the rate of return which is justified in law, and therefore that the relief sought by the complainant could not be granted. In conclusion the commission said:

"If the valuation is not too high, and that is a matter which can not be discussed under the agreement to use the valuation, then the return of 4½ to 5 per cent is too low to permit the reduction demanded. There is no escape from that conclusion. In so holding we are controlled by the law,

with no room in any sense for the exercise of discretion. A 6 per cent return upon capital employed in the public service has been deemed to be a minimum fair return, and this after all other allowances necessary to the conduct of the business shall have been made. In many cases a considerably higher rate of return has been held to be required. There may arise here and there cases of over installation of property or over extension of lines where, the general rate being involved, peculiar conditions would justify the conclusion that a lower return than has been ordinarily allowed would be fair. But we have no such peculiar conditions in this case where a special rate is demanded and all of respondent's property and lines are fully required for the public service in Rochester. Since we find that the proposed reduction would reduce respondent's net revenue from operation on the basis of the traffic for the year ended June 30, 1914, to as low as 4½ or 5 per cent upon the valuation agreed upon by the parties herein it is idle to speculate upon what would be a fair return upon such valuation to the respondent."

ANOTHER COMPANY PUBLICATION

The *Southern Public Utilities Company Magazine* has been established by the Southern Public Utilities Company, Charlotte, N. C., "in the interests of the company and for the pleasure and profit of the employees and the public they serve." The first issue is dated Feb. 10. It contains twenty-eight pages and cover. The size is 6 by 9 in. Z. V. Taylor, president of the company, in announcing the publication said:

"For its own interests, and the pleasure and benefit of its officers and employees, the Southern Public Utilities Company has created a publicity department, the chief activity of which is the publication of this magazine, a copy of which goes to every officer and employee of the company. The publicity department has been created for the sole purpose of bringing the men in the various departments into closer relation with the management and with themselves, and in this way developing a higher degree of efficiency, the ultimate aim being to make every patron of the utilities operated by Southern Public Utilities Company a satisfied customer. In charge of this department, the company has placed Leake Carraway, a newspaper man of long years of training, competent and efficient, and for him the company asks the co-operation of every officer and employee, so that this department may at once begin performing its proper function. The purpose of the department and the magazine will be gone into more in detail by the editor."

Mr. Carraway said in part:

"This publication will be used to tell from time to time of especial achievements of individuals, departments, and branches, giving credit where credit is due. The management desires the employees to consider this magazine their own personal property, and suggestions concerning its contents will always be gladly received, the object being to print herein such matter as may be of value to them. The hearty co-operation of the men is asked by the editor, without which the publication will fail to perform its proper function. He invites personal letters and visits from the men at their convenience and pleasure, and believes that with their assistance the magazine may be made of great benefit and pleasure to them, and incidentally of value to the public through service rendered."

TRANSFER SUIT DECISION

Judge A. J. Murphy, of the Wayne Circuit Court, handed down an important and interesting opinion in a suit for damages against the Detroit (Mich.) United Railway over a transfer dispute when he held that it is not proper for a passenger so to conduct himself as to interrupt the continuity of street railway service. In directing a verdict for the defendant company, Judge Murphy laid down the principle that the inconvenience of the individual must be subordinated to the convenience of the public. He outlined that the passenger could have paid another fare or left the car, and it was his legal duty to do one or the other. Failing in either, and holding up the service in an altercation with the conductor to the inconvenience of the traveling public, the plaintiff was without redress, the judge decided.

INDIANAPOLIS TRAFFIC

Official Statement of Passenger Traffic and Interurban Statistics at the Indianapolis Traction Terminal

The following tables relating to the interurban passenger traffic handled through the traction terminal station at Indianapolis, just made public by E. B. Peck, vice-president of the Indianapolis Traction & Terminal Company, who has the direct management of the terminal stations and building, show an increase of nearly 500,000 passengers for the year 1914 as compared with 1913. The population of Indianapolis in 1900, when the first interurbans entered the city, was 169,164. It is now estimated as slightly in excess of 250,000, and a great deal of the growth of the city is attributed to the rapid development of the interurban systems. In considering the 7,012,763 passengers actually handled in and out of Indianapolis in 1914, each person is theoretically considered as making a round trip, and on this basis the actual number of visitors to Indianapolis during the year is estimated at 3,506,281.

DATES WHEN INTERURBAN LINES COMMENCED OPERATING INTO INDIANAPOLIS

Indianapolis, Columbus & Southern Traction Co.	Jan. 1, 1900
T. H. I. & E.—Eastern Division	June 17, 1900
Indiana Union Traction—Muncie Division	Jan. 1, 1901
T. H. I. & E.—Martinsville Division	Aug. 2, 1902
T. H. I. & E.—Brazil Division	Sept. 15, 1902
Indianapolis & Cincinnati—Shelbyville Division	Sept. 12, 1902
T. H. I. & E.—Northwestern Division	Oct. 9, 1903
Indiana Union Traction—Logansport Division	Dec. 3, 1903
Indianapolis & Cincinnati—Rushville Division	July, 1905
T. H. I. & E.—Danville Division	Sept. 1, 1906
Indianapolis, Crawfordsville & Western	July 4, 1907
Indianapolis, Newcastle & Toledo	June 29, 1910
Beech Grove Traction Company	March, 1911

The total number of passengers carried since 1900 was as follows: 1900, 377,761; 1901, 955,554; 1902, 1,523,411; 1903, 2,347,936; 1904, 3,274,654; 1905, 3,881,332; 1906, 4,469,982; 1907, 5,032,677; 1908, 4,979,371; 1909, 5,156,906; 1910, 5,736,272; 1911, 6,279,822; 1912, 6,431,714; 1913, 6,524,366; 1914, 7,012,763.

INDIANAPOLIS TRACTION & TERMINAL COMPANY, TOTAL NUMBER INTERURBAN AND SUBURBAN PASSENGERS ARRIVING AND DEPARTING—INDIANAPOLIS

Month	Passengers, 1914	Passengers, 1913
January	478,863	479,855
February	401,591	448,686
March	509,399	411,531
April	538,348	438,073
May	715,284	645,432
June	666,108	672,562
July	735,369	710,220
August	683,369	659,443
September	618,406	584,804
October	594,270	555,272
November	527,556	381,853
December	544,200	536,635
Totals	7,012,763	6,524,366
Average per day	19,213	17,875

INDIANAPOLIS TRACTION & TERMINAL COMPANY, TOTAL NUMBER INTERURBAN AND SUBURBAN CARS ARRIVING AND DEPARTING—INDIANAPOLIS

	1914		1913	
Month	Passenger Cars	Freight Cars	Passenger Cars	Freight Cars
January	20,149	2,036	20,058	2,057
February	17,315	1,692	18,434	1,832
March	20,832	2,021	†16,442	1,554
April	20,584	2,085	16,260	1,503
May	24,243	2,113	22,499	2,107
June	23,078	2,191	22,683	2,182
July	24,896	2,266	24,120	2,302
August	23,984	2,347	‡23,506	2,058
September	22,364	2,260	22,742	2,155
October	21,230	2,296	22,053	2,320
November	20,069	2,051	*15,692	1,480
December	21,062	2,130	22,064	1,951
Totals	259,806	25,488	246,823	23,501
Average per day	712	70	676	65

†Flood March 25, 1913. ‡Interurban strike Aug. 25, 1913. *Indianapolis strike Oct. 31, 1913.

THROUGH LIMITED TRAINS ARE OPERATED BETWEEN INDIANAPOLIS AND

	Miles	Time	No. Trains Daily Each Way
Ft. Wayne, Ind.	136	4 hours 55 min.	10
Goshen, Ind.	160	5 hours 27 min.	2
Louisville, Ky.	117	4 hours	6
Terre Haute, Ind.	72	2 hours 25 min.	7
Marion, Ind.	72	2 hours 40 min.	2
Lafayette, Ind.	70	2 hours 10 min.	5
Richmond, Ind.	70	2 hours 35 min.	7
Muncie, Ind.	57	1 hour 50 min.	10
Connersville, Ind.	58	1 hour 55 min.	4
Greensburg, Ind.	49	1 hour 45 min.	6

FARES IN LETHBRIDGE

The *Canadian Railway and Marine World* prints the following report made to the City Council of Lethbridge, Can., by Commissioner A. Reid, who recommended the raising of fares on the municipally operated street railway line:

"From Jan. 1 to Oct. 31, 1914, the number of street railway fares paid by regular tickets (six for 25 cents) was 396,737; number paid by limited tickets (8 for 25 cents) was 144,194, or nearly 31 per cent of that paid by regular tickets; number paid by cash was 289,907, or 73 per cent of that paid by regular tickets; number of fares paid by limited tickets was about 26 per cent of that paid by cash and regular tickets; returns from children's tickets amount to $786.39; from limited tickets, $4,506.08; from regular tickets, $16,530.70, and from cash fares, $14,495.34.

"If the number of passengers carried remained the same up to Oct. 31, 1914, and we had charged 5 cents instead of giving six tickets for 25 cents the revenue would have been increased $3,300, and if six tickets for 25 cents had been given instead of eight for 25 cents the revenue would have been increased $1,500, making a total of $4,800.

"After a careful study of the above, and considering the small percentage of passengers using limited tickets, I would recommend the following changes, to go into effect on Dec. 1: That the use of the present limited tickets be discontinued, and the regular tickets (six for 25 cents) be substituted; these tickets to be good for the following hours: 6 to 8 a. m., 12 noon to 2 p. m., and 5 to 7 p. m. The regular fare to be 5 cents and 10 cents after midnight. Children's tickets (ten for 25 cents) to be continued. Two children to travel on one 5-cent fare, but not on one ticket. If children's tickets are used, each child must have a ticket, and the age limit be from five to fourteen years. Children under five to travel free.

"The present employees' tickets to be discontinued and books of blue tickets substituted (twenty-five for $1). The carrying of policemen and firemen free to be discontinued, and these departments to purchase blue tickets as required."

Report on Subway Air.—Commissioner of Health Goldwater of New York proposes to report to the Public Service Commission of the First District the result of tests of air taken from the subway and examined under his supervision to determine the degree of germ saturation.

Street Flushing in Columbus.—The city officials of Columbus, Ohio, are negotiating with the Columbus Railway, Power & Light Company to flush the streets. Figures already secured indicate that the expense will be less than half what it has been with wagons. If the arrangements are completed the company will purchase a tank car with a capacity of 4000 gal.

Interurban Brings Farmer and Laborer Together.—J. F. Strickland, president of the Texas Traction Company, Dallas, Tex., announced recently that a "labor special" would be run between Dallas and Sherman to afford farmers in Dallas, Collin and Grayson Counties an opportunity to get into touch with prospective farm hands aboard the train recruited among the unemployed in Dallas.

Hearing on Trailers.—At the hearing before the District Electric Railway Commission on Feb. 16 representatives of the Washington Railway & Electric Company and the Capital Traction Company urged the commission to rescind the order against the operation of trail cars except when separate conductors are used. They contended that a single conductor made for safety. The commission reserved decision.

Report on Montreal Traffic.—G. R. Macleod, railway engineer of the City Council of Montreal, Que., has made a special report on the tramway system. He states that additional and improved facilities are needed, both for the satisfactory handling of street railway traffic and general street traffic, particularly in the more central thoroughfares of the city. Mr. Macleod is against the opertion of motor buses. He suggests the building of several subways.

Prepayment System in Suburban New York.—The Westchester Electric Railroad, operating in Mount Vernon and New Rochelle, N. Y., has equipped all its cars with fare boxes and hereafter will use the pay-as-you-enter system of fare collection. The company also plans to rebuild its closed cars and install a prepayment vestibule with a door closing and step lifting mechanism similar to that recently developed by the Third Avenue Railway, New York, of which it is a subsidiary.

Seattle Fare Hearing.—The Public Service Commission of Washington has set March 1 as the date for hearing the case of the city of Seattle against the Puget Sound Traction, Light & Power Company relative to a complaint alleging that the company is charging more than a 5-cent fare within the city limits. It appears that there are some small stations where stops are made by interurban trains inside of what was formerly Georgetown, now South Seattle, where the fares are 6 and 8 cents.

Change in Fares on International Railway.—The International Railway, Buffalo, N. Y., has filed with the Public Service Commission of the Second District the following changes in local round trip fares effective on March 1: Between Buffalo and Lockport 60 cents, advance of 10 cents; between Buffalo and Niagara Falls 60 cents, reduction in unlimited fare 5 cents; fare of 50 cents for ticket limited to within ten days from date of sale is canceled; between Lockport and Niagara Falls 60 cents, an advance of 10 cents.

Through Service Discontinued.—On account of the withdrawal of the Dayton & Troy Electric Railway, the through service between Toledo and Dayton over the lines of the Toledo, Bowling Green & Southern Traction Company, the Western Ohio Railway and the Dayton & Troy Electric Railway by way of Lima will be discontinued on March 1. This service was established five years ago. The route is 162 miles in length. The Toledo, Bowling Green & Southern Traction Company and the Western Ohio Railway will continue the service over their lines, the terminals being Toledo and Piqua, 131 miles distant.

Fare Suit Dismissed.—The suit to compel the Portland Railway, Light & Power Company, Portland, Ore., to charge a 5-cent fare to all points on the Cazadero Line west of Lents Junction and to issue transfers between Lents Junction on the Mt. Scott line and Watson Station on the Cazadero Division has been dismissed by Circuit Judge Cavanaugh on demurrers filed by the company. The court held that the State law prohibiting a charge of more than 5 cents for any continuous ride within city limits had been repealed by implication by the public utility law and that the suit, brought by the District Attorney for the State, should have originated with the State Railroad Commission.

Change in Passenger Rates.—The Newark & Marion Railway, Newark, N. Y., has filed with the Public Service Commission of the Second District of New York, effective on March 17, the following changes in rates: Local cash fares advanced 5 cents between Newark and Mills, East Palmyra, Jaggers, Manders, Rich and Marion; 10 cents between Newark and Mill street; 5 cents between Town Line and Manders, Mill Street, and Marion, and 5 cents between Fishers and Mill Street and Marion; reduction of 5 cents between Mills and Fishers. Ticket fares between Newark and Marion advanced 5 cents one way and 10 cents round-trip. Fare for weekly ticket, good for six round-trips between Newark and Marion within seven days including date of sale, advanced from $1.50 to $1.80.

Mr. Whitridge's Snow Pictures.—As a result of a notice posted by Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., in all the surface cars of the system, offering prizes of $5 and $10 for the best photographic evidence of the extent to which surface cars are delayed and blocked by wagons of all descriptions following snow falls the offices of the company have been swamped with offerings from competitors. From the photographs submitted it was not difficult, according to the New York *Sun* of Feb. 21, to select more than twenty to which the awards were allotted. Very few of the pictures needed explanation, although, of one, which showed a Third Avenue car shoving a loaded coal wagon up the hill on Amsterdam avenue, Mr. Whitridge remarked: "I venture to say that there is not a pound of coal goes up that hill that isn't pushed up by our surface cars." The *Sun* published five of the photographs.

Fares in Edmonton.—The item regarding fares in Edmonton published in the ELECTRIC RAILWAY JOURNAL of Feb. 6, page 311, was in error through a mistake made by

the Canadian correspondent of this paper in dating the item. According to J. H. Larmonth, superintendent of the Edmonton (Alta.) Radial Railway, there has been no change in the rate of fare at Edmonton since last May, when practically a straight 5-cent fare was adopted. The rates of fare in Edmonton now are for adults, good at all times of the day, 5 cents or five tickets for 25 cents; limited tickets, during the hours of 5:30 a.m. and 8 a.m., six tickets for 25 cents; children under fourteen years old, twelve tickets for 25 cents. The item as originally published referred presumably to changes at Lethbridge of which mention is made elsewhere in this issue.

Restoration of Through Service Ordered at Boston.—The Massachusetts Public Service Commission has ordered the Boston Elevated Railway to restore through service between Oak Square, Brighton and Central Square, Cambridge, via River Street, covering both normal and rush hours. In a petition to the board the Faneuil Improvement Association objected to the requirement of transferring at either of two points in the Brighton district in the intersuburban trip between Central and Oak Squares, which is afforded by the River Street and the Western Avenue lines radial to the Cambridge subway from Central Square. In its finding the board holds that the company should maintain through service on one of these virtually parallel routes at all hours, but does not require a dual through service in view of the transfer facilities available upon a single fare.

Commission Approves Boston Transfer Facilities. — The Public Service Commission of the State of Massachusetts has approved the establishment of free transfer privileges by the Boston Elevated Railway in connection with the opening for service of the westerly section of the Dorchester tunnel. The Washington Street and Dorchester tunnels cross at different grades at Washington, Winter and Summer Streets and the transfer facilities in general provide for interchange between north and southbound, east and westbound surface and tunnel cars and trains. The board has ordered the establishment of free transfer privileges at Dewey Square, Boston, between southbound Atlantic Avenue and Washington Street-Dudley Street surface cars, and between northbound cars boarded on Washington Street between Dover and Boyleston Streets and Powers Wharf-Atlantic Avenue cars.

Albany Traffic Figures.—C. F. Hewett, general manager of the United Traction Company, Albany, N. Y., has filed with the Public Service Commission of the Second District of New York the figures of the check which the company has made of the traffic during the last thirty days. In a letter accompanying the figures Mr. Hewitt says: "From our first analysis of these checks we are inclined to the belief that we are giving very satisfactory service on all the lines checked, with the exception of a few trips in the morning and evening on the Delaware Avenue and West Albany lines, and it would seem that a readjustment of the spacing of the cars should be made to more suitably conform to the flow of traffic. Before we take this step, however, and after your electric railroad inspector has had an opportunity of examining these checks, we would like to have a conference with him in reference to these readjustments."

Tobacco Shipments.—In view of the fact that incoming freight business on the Louisville & Interurban Railroad has been light in the last few weeks, C. H. Wyatt, general freight agent of the company, has been active in securing tobacco traffic between Shelbyville, which is an important loose-leaf market 30 miles out, and Louisville, where the shipments are concentrated. The steam roads heretofore have enjoyed this business, but by going after it vigorously Mr. Wyatt has been able to secure shipments to make the return trips to Louisville pay. In the six weeks of this year the company has hauled about 1,200 hogsheads, using extra cars only when quick deliveries were imperative. The Louisville & Interurban Railroad has a potential advantage over the steam roads in that it is able to run its cars to the very doors of the tobacco warehouses, thus eliminating the expense of drayage. The largest steam cars hold about fifteen or sixteen hogsheads, while the regular freight cars of the Louisville & Interurban accommodate about thirteen or fourteen hogsheads.

Personal Mention

Mr. H. L. Beach, Chicago, has been appointed manager of the Utah Light & Traction Company, Salt Lake City, Utah, to succeed Mr. Joseph S. Wells.

Mr. Joseph S. Wells, formerly manager of the Utah Light & Traction Company, Salt Lake City, Utah, has been elected secretary, treasurer and a director of the company.

Mr. C. S. Banghart, who became connected with the Binghamton (N. Y.) Railway in August, 1914, as general manager, has in addition been elected vice-president and a director of the company.

Mr. Will Clapper has been appointed traffic manager of the Interurban Railway, Des Moines, Ia., to succeed Mr. C. T. Chapman, whose appointment to the Dan Patch Air Line is referred to elsewhere in this column.

Mr. H. C. Snyder has been appointed general manager of the Wahpeton-Breckenridge Street Railway, Breckenridge, Minn., to succeed Mr. H. C. Hartung, whose appointment to the Lewiston-Clarkston Transit Company is noted elsewhere in this column.

Mr. David Daly, manager of the Houston (Tex.) Electric Company, has been appointed second vice-president of the Southwestern Electrical & Gas Association, succeeding Mr. C. W. Kellogg, Jr., who recently left the Southwest to become manager of the Mississippi River Power Company at Keokuk, Ia.

Mr. C. W. Whitley, Salt Lake, has been elected president of the Utah Light & Traction Company, Salt Lake City, Utah, which controls the electric railway properties in Salt Lake City and has leased the electric light and power properties in Salt Lake and Ogden and its gas business in Ogden to the Utah Power & Light Company.

Mr. H. C. Hartung has resigned as general manager of the Wahpeton-Breckenridge Street Railway, Breckenridge, Minn., effective on March 1 to become general manager of the Lewiston-Clarkston Transit Company at Lewiston, Idaho. The construction work of the Lewiston-Clarkston Transit Company's line is expected to commence about March 15.

Mr. Leake Carraway, a newspaper man of long experience, has been appointed to the head of the publicity department of the Southern Public Utilities Company, Charlotte, N. C., with direct charge of the *Southern Public Utilities Company Magazine*, established by the company in its own interest and for the pleasure and profit of the employees and the public.

Mr. C. T. Chapman, traffic manager of the Interurban Railway, Des Moines, Ia., has been appointed to the same post with the Dan Patch Air Line, Minneapolis and St. Paul, and will take up his new duties on March 1. Mr. Chapman became connected with the Interurban Railway with Mr. James R. Harrigan when the latter took charge of the Des Moines City Railway in the spring of 1911.

Mr. C. J. Griffith, general manager and treasurer of the Little Rock Railway & Electric Company, Little Rock, Ark., has been elected president of the Chamber of Commerce of that city. The nominating committee of the chamber named Mr. Griffith as candidate with a board of seventeen members representing the blue ticket and Mr. W. S. Brandon with a board of seventeen representing the red ticket. A campaign was conducted for two weeks, the result of which was the election of the entire blue ticket. Some 800 business men are members of the Chamber of Commerce and Mr. Griffith and the blue ticket carried the election two to one.

Mr. H. M. Byllesby was guest of honor at a dinner given by the employees of H. M. Byllesby & Company, Chicago, Ill., on Feb. 16 at the Congress Hotel in that city. The occasion was Mr. Byllesby's fifty-sixth birthday. Mr. M. A. Morrison was toastmaster. Among the speakers were: Messrs. J. J. O'Brien, R. J. Graf, E. C. Braun, R. G. Hunt, W. R. Thompson, H. W. Fuller, W. H. Hodge, B. W. Lynch, W. H. Clarke, F. H. Lane and W. C. McKenna. Mr. Byllesby replied in a delightful talk filled with suggestions, advice, optimism and reminiscences of some of the prominent men who influenced his work and ambitions, such as

Mr. Thomas A. Edison and Mr. C. A. Coffin and the late William C. Whitney and the late George Westinghouse.

Mr. W. W. Magoon, general manager of the Ohio Valley Electric Railway, Huntington, W. Va., has resigned, effective on May 1. Mr. Magoon became connected with the street railway properties at Huntington in 1893 when he accepted the position of bookkeeper for the Consolidated Light & Railway Company, which built the first railway in that city. In September of the same year he was made superintendent, and in 1894 was elected secretary and general manager to succeed Mr. F. L. Doolittle. He continued in that position until 1904 when he resigned to become connected with Cole & Crane in Cincinnati, where he remained for three years. Returning to Huntington in 1907, he resumed the position of general manager of the Ohio Valley Electric Railway. Mr. Magoon expects to take a vacation, but his plans for the future have not been definitely decided. The Huntington *Advertiser,* in commenting editorially on Mr. Magoon's resignation, said that his retirement from the company "marks the close of a long and honorable service rendered to the Ohio Valley Electric Railway and its predecessors." Another local paper said editorially it was the sincere wish of those who had so long known him and been associated with him that Mr. Magoon would continue to enjoy the privileges of Huntington citizenship.

Mr. Richard McCulloch, who has been elected president of the United Railways, St. Louis, Mo., was born in St. Louis County on June 3, 1869. Mr. McCulloch was educated in the St. Louis public schools and Washington University, where he was graduated from the engineering department in 1891. He was later (1905) given the honorary degree of Master of Arts by Washington University. After spending one season in the service of the United States Geological Survey and one year in Mexico in the mining business, he became chief engineer of the National Railway, St. Louis, which at that time owned the railways in the northwestern part of the city, which are now the Broadway, Lee, Cass, Natural Bridge, Wellston and Seventh Street lines. The Broadway and Wellston lines were cable roads, and the others were horse roads, which were converted to electric traction. Most of this work was done under the supervision of Mr. McCulloch. In 1899 Mr. McCulloch went abroad for two years. During this time he built and put in operation the electric railway system of Geneva, Switzerland, and also spent some time planning the construction of a network of interurban railways radiating from Lille, northern France, near the Belgian frontier. In 1901 Mr. McCulloch returned to America, where he became assistant general manager of the Chicago City Railway, which operated the lines on the South Side, comprising about one-half the mileage of the surface lines of Chicago. In 1904, the year of the World's Fair, Mr. McCulloch became connected with the United Railways, St. Louis, as assistant general manager, and in 1909 was made vice-president. Upon the death of Capt. Robert McCulloch, in the Fall of 1914, he was made general manager, and was elected president at the annual election on Feb. 9.



RICHARD M'CULLOCH

OBITUARY

A. Wissel, director of the Rheydt Municipal Railways, Rheydt, Germany, was killed in battle in Poland on Dec. 2, 1914.

Judge William M. Kavanaugh, ex-United States Senator from Arkansas, president of the Little Rock Railway & Electric Company, Little Rock, president of the Southern Trust Company, Little Rock, and president of the Southern Association of Baseball Clubs, died at his home in that city on Feb. 21 suddenly from acute indigestion. Judge Kavanaugh was fifty years old. He was a native of Kentucky.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Application for a charter has been made by this company in Idaho to build electric railways in the Lewiston-Clarkston Valley from Lewiston to the Orchard Tracts, to Asotin and through Clarkston and to the fair and stock grounds east of Lewiston. Capital stock, $500,000. Incorporators: A. G. Nortz, E. H. Nortz and G. W. Burrows, Breckenridge, Minn.; W. N. Nortz, Devil's Lake, N. D., and R. C. Dahlhjelm and Eugene A. Cox, Lewiston. [E. R. J., Jan. 31, '14.]

***Alva, Buffalo & Colorado Railroad, Buffalo, Okla.**—Chartered in Oklahoma to build a 20-mile interurban railway, the motive power to be either steam, electricity or gasoline, between Buffalo and Rosston. Capital stock, $10,000. Incorporators: J. H. Moran, L. A. Walton, George Stafford, L. L. Walton and I. M. Morgan, all of Alva, Okla.

FRANCHISES

***Los Angeles, Cal.**—A number of the improvements associations of the southern part of Los Angeles have formally petitioned the City Council to offer for sale an electric railway franchise on South Park Avenue from Thirtieth Street southerly to Manchester Avenue, a distance of several miles. The matter will be considered by the Board of Public Utilities within the next few days.

Stockton, Cal.—The Central California Traction Company has asked the Council for a franchise to extend its lines on North Sacramento Street in Stockton.

Chicago, Ill.—The Chicago & Northern Interurban Railway has asked the State Public Utilities Commission of Illinois for a certificate of convenience and necessity to build a 12-mile electric railway from the city limits of Chicago to Wheeling. Jordan E. Van Natta, Chicago, attorney for the company. [E. R. J., July 18, '14.]

Pocatello, Idaho.—J. R. Munn has received a franchise from the Council to build an electric railway in Pocatello. [E. R. J., Feb. 20, '15.]

Findlay, Ohio.—An ordinance giving the Toledo, Bowling Green & Southern Traction Company a twenty-five-year franchise in Findlay has had its first reading in Council. It requires that the company pay the city 2 per cent of its earnings on the local lines, after it has paid 6 per cent dividends on its investment. It is said that the company will accept the ordinance.

Lorain, Ohio.—A renewal of its franchise is being sought by the Lorain Street Railway and the city authorities have asked Street Railway Commissioner Witt of Cleveland to aid them in their negotiations with the company.

Massillon, Ohio.—A petition has been signed by residents of North Mill Street asking the City Council to confer with the Northern Ohio Traction Company in regard to building a line in North Mill Street from Cherry Street to the city limits of Massillon.

Hamilton, Ont.—Formal application will be made by the Council to the railway board to order the Hamilton Street Railway to relay its tracks on York Street, King West Street, Margaret Street and Herkimer Street in Hamilton.

Toronto, Ont.—The Forest Hill Electric Railway will ask for a franchise at the next session of the Ontario Legislature for an extension of time until 1917 in which to begin the construction of its line. [E. R. J., Feb. 13, '15.]

Toronto, Ont.—The Ontario Railway & Municipal Board has instructed the Toronto Railway to complete certain lines recently ordered by the board.

Milwaukee, Wis.—Residents on Green Bay Avenue and on Twenty-seventh Street in Milwaukee have petitioned the City Council for an extension of the electric railway on the Third Street and Twenty-seventh Street lines to the city limits of Milwaukee. Under the blanket franchise the Milwaukee Electric Railway & Light Company is obliged to develop its tracks as directed by the Council in Milwaukee.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Something more than $150,000 will be required to complete the work begun in 1914 in the various departments of this company. The largest item is for the completion of the First Avenue viaduct. Most of the expenditures will be for improvements and maintenance of the present system.

***Pratt Consolidated Coal & Iron Company, Birmingham, Ala.**—This company is building an electric line from its Maxime mine to a point near the Warrior River, where the backwater from lock 17 will touch. Surveys have been made and work will soon be begun laying the rails.

North Alabama Traction Company, New Decatur, Ala.—This company has received permission from the Senate to build a new bridge over the Tennessee River near Decatur, Ala.

Argenta (Ark.) Railway.—During the next few weeks this company expects to complete 1,000 ft. of track reconstruction and 2,000 ft. of new track, extending its Washington Avenue line to the Rock Island station in Argenta.

Phœnix (Ariz.) Railway.—The Brill extension to Princeton Heights has been completed by this company and will soon be placed in operation.

Calico Rock, Ark.—As soon as financial arrangements can be made this company will begin work on its proposed electric railway to connect Hoxie and Calico Rock. J. W. Myers, Calico Rock, is interested. [E. R. J., Jan. 23, '15.]

***Eureka, Cal.**—Plans and specifications are being considered to build an electric railway to enter Eureka over a line to be built down the Klamath River from Klamath Falls to Requa, and thence down the coast by way of Trinidad. Power will be obtained at Ishi Pishi Falls, on the Klamath River, near the mouth of the Salmon River.

San Francisco (Cal.) Municipal Railway.—This company has placed in operation its California Street municipal line as far as Fourteenth Street in San Francisco. It will be built as far as Thirty-third Avenue. This new line connects with the Geary Street line at Second Avenue, its route being over Second Avenue and Cornwall Street and California Street.

Sausalito (Cal.) Incline Street Railway.—Plans and specifications for this proposed electric cable railway have been completed and the company will soon call for bids for winding machinery, rails, slot bars, cables, ties, pulleys, electric motors, cars and electric trolley equipment, etc. For further information address A. E. Roberts, Sausalito, chief engineer. [E. R. J., Jan. 2, '15.]

New Britain (Conn.) Street Railway.—Preliminary arrangements are being made by this company to complete the organization of this company to build an electric railway between Hartford and New Britain and between New Britain and Plainville. Capital stock, authorized, $500,000. Mortimer H. Camp, New Britain, is interested. [E. R. J., Feb. 13, '15.]

Jacksonville-Middleburg Electric Railway, Jacksonville, Fla.—Grading is under way on the section of this line from Jacksonville Heights to Jacksonville and will stop at the Seaboard Air Line Shops, and when this section is built the company will begin on the Middleburg end and close in the section between the two. Right-of-way along the entire 24 miles from Jacksonville to Middleburg has been secured. The first 10 miles have been financed and material and labor have been contracted for. Application for a charter will soon be made. A. W. Mackinlay, general manager. [E. R. J., Feb. 6, '15.]

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Plans are being made by this company to begin work about March 15 on its electric line between Lewiston and Clarkston. Orders will be placed at once for material, machinery and line material. H. C. Hartung, Lewiston, Idaho, general manager. [E. R. J., Jan. 31, '14.]

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—Preliminary arrangements are being made by this company to build its 8-mile line between Murphysboro and Carbondale. The work will include one 175-ft. span single-track bridge and a 60-ft. plate girder span. The date of the letting of contracts has not been decided. Edward Flad & Company, St. Louis, Mo., engineer. [E. R. J., Feb. 6, '15.]

Pekin & St. Petersburg Interurban Railway, Pekin, Ill.—Contracts will be awarded at once by this company for the proposed reconstruction and extension of its lines in Pekin.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—Preliminary surveys will be begun in Quincy the first week in April by this company on its line between Quincy and Peoria. Work has already been begun on the eastern section of this proposed line. J. L. Soebbing, president. [E. R. J., Feb. 13, '15.]

Peoria & Chillicothe Electric Railway, Peoria, Ill.—The stockholders of the proposed electric railway from Peoria, Ill., to Chillicothe, Ill., have held their first meeting and named an executive committee of five to engage an engineer and to begin the work. The executive committee consists of E. V. Mattice, Henry T. Mallen, W. V. Burroughs, E. A. Mitchell and Arthur C. Black. This committee was given full power in matters of organization. At an organization meeting of the committee Mr. Mitchell was elected chairman and Mr. Black secretary. It is expected that work will begin upon this route shortly after March 1. The line will run from Peoria through Mossville, Rome and Chillicothe and will terminate at the Santa Fé depot in North Chillicothe.

Quincy (Ill.) Railway.—Plans are being considered by this company to reconstruct and improve some of its lines in Quincy.

Springfield & Central Illinois Traction Company, Springfield, Ill.—Plans are being considered by this company to begin work soon on its electric line through southern Illinois and Indiana, with St. Louis as the western terminus. The right-of-way has been obtained from Terre Haute, Ind., to St. Louis, and also for an intersecting line from Springfield to Duquoin, Ill. The necessary franchises have been granted. Isaac A. Smith, St. Louis, Mo., president. [E. R. J., Jan. 9, '15.]

Trenton & Mercer County Traction Corporation, Trenton, N. J.—An extension of the Warren Street and Fair Street division in Trenton, making a belt line to parallel the municipal docks, is being contemplated by this company.

Brooklyn (N. Y.) Rapid Transit Company.—The new Lutheran Cemetery Elevated Line, extending from Ridgewood depot to Fresh Pond station, has been placed in operation at once by this company.

Manhattan & Queens Traction Corporation, New York, N. Y.—Plans are under way for the extension of this company's tracks from Archer Street and Jamaica Avenue down Archer Street to Sutphin Road and through Sutphin Road to Pacific Street in Jamaica.

Cleveland (Ohio) Railway.—This company will soon ask the Council to authorize an expenditure of approximately $840,000, mainly to be used in renewing and resurfacing track in Cleveland. About 21 miles of tracks are to be renewed, 5 miles resurfaced and a $200,000 turbine installed, according to plans recently announced.

Oklahoma Union Traction Company, Tulsa, Okla.—Plans are being considered for improvements of this company's lines in Tulsa.

Berlin & Northern Railway, Berlin, Ont.—During the next few weeks this company plans to complete its ½-mile extension in Berlin.

London (Ont.) Street Railway.—Plans are being made by this company to extend, double-track and install switches on some of its lines in London.

Toronto (Ont.) Civic Railway.—Work on the civic car line on Lansdowne Avenue south from St. Clair Avenue in Toronto will be begun soon. The work will involve an expenditure of $105,000.

Toronto, Ont.—Representatives of Whitchurch Township waited on the Hydro-Electric Power Commission of Ontario Feb. 17 at Toronto, requesting that a survey and estimates be prepared of a proposed new radial railway starting in Whitchurch and extending northerly to Georgian Bay. The suggested route of the new line begins at the northern trunk of the Hydro radial proposed to run to Vandorf, along the Concession of East Gwillimbury and thence on to Queensville and Sharon, and northerly to Collingwood, via Barrie and Innisfail.

McKinney, Bonham & Paris Interurban Railway, McKinney, Tex.—Preliminary arrangements are being made by this company to begin work soon on its line between Bonham, McKinney, Paris and Blue Ridge. This line will reach Dallas by way of the Texas Traction Company's line from McKinney to Dallas. L. A. Scott, president. [E. R. J., Nov. 21, '14.]

Dallas (Tex.) Northwestern Traction Company.—At a recent meeting of the stockholders of this company directors were named who selected the following officers: E. P. Turner, president; L. M. Dabney, vice-president; Benjamin B. Cain, treasurer; George Williams, secretary, and John T. Witt, chief engineer. [E. R. J., May 30, '14.]

Dallas (Tex.) Southwestern Traction Company.—Work will soon be begun by this company on its extension from Dallas to Brownwood via Mansfield, Venus, Alvarado, Cleburne, Glen Rose, Hico and other towns. Eventually it will be extended west from Brownwood to San Angelo. At a recent meeting of the directors of this company the following officers were elected: E. P. Turner, president; S. P. Cockran, vice-president; George Williams, secretary and treasurer, and John T. Witt, chief engineer.

Ridgeley & Millerdale Electric Railway, Ridgeley, W. Va.—Work will be begun within the next few weeks by this company on the unfinished electric line in Ridgeley. John L. Miller, president of the company, has purchased a large amount of steel rails and a heavy bridge is to be placed over the Western Maryland Railway tracks near Knobley tunnel. The work on this electric line has been going on intermittently for two years. [E. R. J., Nov. 11, '11.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company has opened its new depot in Culver City.

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—During the next few weeks this company expects to build a new carhouse with an addition to be used as a power house and office building in Lewiston.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company has opened headquarters in the Rorabaugh-Wiley building in Hutchinson.

Boston & Worcester Street Railway, Boston, Mass.—This company's carhouse in Westboro was destroyed by fire on Feb. 18. The loss, which includes ten cars, is estimated to be about $100,000.

Detroit (Mich.) United Railway.—The building at Jefferson Street and Bates Street in Detroit is being remodeled by this company for use as an interurban station and general offices. It is expected to have this structure completed within the next four months. To make use of the new building a re-routing of interurban cars will be necessary.

POWER HOUSES AND SUBSTATIONS

Mobile Light & Railroad, Mobile, Ala.—This company will add to its equipment a two-unit, two-bearing, 150-kw generator booster set ordered from the General Electric Company.

San Joaquin Light & Power Company, Bakersfield, Cal.—New machinery is being installed by this company at its substation in Madera.

Lewiston-Clarkston Transit Company, Lewiston, Idaho—During the next few weeks this company expects to purchase one 125 motor-generator set for its power house in Lewiston.

Chicago, Milwaukee & St. Paul Railroad, Chicago, Ill.—This company has ordered from the General Electric Company three substation equipments for the electrification of its second locomotive division between Three Forks and Harlowton, Mont., each equipment consisting of two 2000-kw motor generator sets with transformers and switchboard apparatus. These sets are to be duplicates of those covered by the previous order.

Norfolk & Bristol Street Railway, Foxboro, Mass.—This company has bought sixteen General Electric 200 C motors for its power house.

Texas Traction Company, Dallas, Tex.—This company will place in operation in substations seven 200-kw and four 300-kw synchronous converters with switchboards and accessories, the contract for all the apparatus having been awarded the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Montoursville, (Pa.) Passenger Railway is rebuilding cars.

Grand Forks (S. D.) Street Railway expects to purchase shortly one motor and one trailer.

Buffalo & Depew Railway, Depew, N. Y., expects to purchase one second-hand double truck for a work car to be built in its own shops.

Ogdensburg (N. Y.) Street Railway expects to purchase within the next six weeks four one-man pay-as-you-enter cars with two-motor equipments.

Sausalito (Cal.) Incline Electric Cable Railway will soon call for bids on cars for its new incline railway. A. E. Roberts, Sausalito, Cal., is engineer.

Lewiston-Clarkston Transit Company, Lewiston, Idaho, expects shortly to purchase about three or four cars, probably double-truck, and very likely second-hand.

New York, Westchester & Boston Railway, New York, N. Y., has issued requests for bids on fifteen new cars of the same general type as those already in operation on this line.

Wilkesbarre & Hazleton Railway, Hazleton, Pa., will issue specifications next week for ten all-steel cars. The cars are designed by L. B. Stillwell, consulting engineer, 100 Broadway, New York.

Boston & Worcester Street Railway, South Framingham, Mass., at the recent fire which destroyed its carhouse on Feb. 18 lost ten of its modern double-truck cars, as noted in detail elsewhere in this issue.

Atlantic City & Shore Railroad, Atlantic City, N. J., is at the present time converting two of its open running-board cross-bench cars into open cars of the center-entrance type with the prepayment feature, at its own shops.

Hagerstown & Frederick Electric Railway, Frederick, Md., is reported as expecting to purchase two 50-ft. 50-passenger cars for operation between Hagerstown and Frederick and one pay-as-you-enter car to be used on the Hagerstown system.

Chicago, Milwaukee & St. Paul Railroad, Chicago, Ill., has ordered nine additional 260-ton electric locomotives from the General Electric Company, for operation on the second engine division of its new electrification, between Three Forks and Harlowton, Mont., a distance of 114 miles.

Southern Public Utilities Company, Charlotte, N. C., has ordered from the Southern Car Company six 40-ft. semi-steel closed passenger cars, to be delivered in 90 days. These cars will be mounted on 39-E Brill trucks with rolled steel wheels and equipped with two GE-80 motors and Westinghouse air brakes.

Toronto (Ont.) Suburban Railway is in the market for six steel 55-ft. motor cars. The company wants only the bodies and trucks, the equipment having been purchased and delivered some time ago. The company is also in the market for five steel 55-ft. trailers. All these cars are for use on the Guelph line extension which it is intended to open up this summer.

TRADE NOTES

The J. G. Brill Company, Philadelphia, Pa., its organization, history and growth, is the subject of a descriptive article in the *Philadelphia Public Ledger* of Feb. 17, 1915.

Ohio Brass Company, Mansfield, Ohio, has received an order for porcelain insulators for the secondary catenary insulation of the Chicago, Milwaukee & St. Paul Railroad's second electrified section between Three Forks and Harlowton.

Walpole Tire & Rubber Company, Walpole, Mass., will, by order of the court, offer its property for sale at Walpole on March 10, 1915. This company was placed in the hands of receivers on Aug. 2, 1913, on account of the failure of the Atlantic National Bank, Providence, R. I. During the period of receivership manufacturing and sales operations have been carried on at a profit for each month's operations. It is expected that the company will continue to carry on business in a vigorous manner after the sale. F. Y. Stewart is

general sales manager. Branch offices are maintained at New York and Chicago.

H. C. Hopson, member of the District of Columbia Bar and certified public accountant, Wisconsin, formerly with the Wisconsin Tax Commission and the Interstate Commerce Commission, has severed his connection of upward of six years with the New York Public Service Commission, Second District, where he was in charge of all financial and accounting examinations relative to capitalization, rates and reorganization and has opened an office in Suite 2425, 61 Broadway. Mr. Hopson is prepared to advise about or undertake general supervision of financing, rates, reorganizations, accounting and valuations of public utilities and railways.

Ford, Bacon & Davis, New York, N. Y., have just issued in pamphlet form, an account of the large cotton-warehouses and terminals in New Orleans, built and operated by the Board of Commissioners of the port of New Orleans, of which they were the engineers. In addition to the large size of these warehouses, the principal feature is the method of internal transportation and handling of the cotton bales. For that work the engineers have introduced a liberal system of electric cranes and elevated railways as well as designed a method of withdrawing one or more bales from the bottom of a pile without disturbing the other cotton in the pile. The New Orleans papers speak of the installation as representing great originality and efficiency in its engineering.

Roller-Smith Company, New York, N. Y., has recently made an improvement in the sensibility of its galvanometer for its direct reading bond tester, which was described in illustrated articles which appeared in the ELECTRIC RAILWAY JOURNAL of March 21, 1914, page 682, and Sept. 15, 1914, page 442. It is essential that the galvanometer in an instrument of this type be as sensitive as possible in order that the highest accuracy may be obtained, but at the same time it is not practical to increase sensibility to the point where ruggedness of design is impaired. An instrument of this type is necessarily subjected to more or less rough usage, and this company has incorporated into the instrument a galvanometer in which high sensibility, and therefore accuracy, and ruggedness of design have been unusually developed.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., reports the receipt of the following recent orders: Interborough Rapid Transit Company, six No. 302-F-2 field control motor equipments, equipped with automatic battery control, for the new Belmont Tunnel; Oakland, Antioch & Eastern Railway, equipments of quadruple No. 333-E, 100 hp motors and HL control, duplicating previous orders; Los Angeles & San Diego Beach Railway, Westinghouse No. 317 motors with automatic control, for a number of motor cars, locomotives and trailer cars which they will shortly place in service and operate in trains during the Exposition at San Diego; Hershey (Pa.) Transit Company, several quadruple equipments of No. 101-B-2 motors, duplicates of those purchased last year; Public Service Railway Corporation, thirty-five quadruple equipments of No. 307 motors with HL control, for use on city lines throughout the Newark district and arranged for train operation. This company has standardized on this type of control and has purchased to date 223 equipments for operation on both city and interurban lines.

ADVERTISING LITERATURE

Prepayment Car Sales Company, New York, N. Y., has issued a highly attractive-looking folder entitled "Might."

Electric Service Supplies Company, Philadelphia, Pa., has issued an attractive folder listing, describing and illustrating "Never-Creep" anchors. Some claims made for this new anchor are that it will not creep because the entire pull is made against undisturbed earth, and that it is easy to install. In this folder the illustrations compare the effectiveness of the different anchors now most popular with that of the "Never-Creep."

Williams, Dunbar & Coleman, New York, N. Y., have issued the second number of their four-part series entitled "Short Stories of Public Utilities." This pamphlet deals particularly with the growth of gas and electric light properties, but in describing the investment value of specific companies includes the following known to the electric railway industry: American Power & Light Company, Portland Railway, Light & Power Company and the Pacific Gas & Electric Company.

Newark Engineering Manufacturing Company, Newark, N. J., has issued a folder which contains illustrations and data on "Shaw" insulators, third rail and line suspension composition insulators. Illustrations are shown of different types of insulators, as installed on the following railways: New York Central & Hudson River Railroad, Third Avenue Railway, Pennsylvania Tunnel & Terminal Company, Long Island Railroad, Interborough Rapid Transit Company, Hudson & Manhattan Railroad.

Wm. B. Scaife & Sons, Pittsburgh, Pa., have issued a folder describing its "We-Fu-Go" water softening and purifying system for boiler feed water in power stations. Views are shown of installations of this system by the Harrisburg (Pa.) Railways and the Bay State Street Railway. Among other railways which have installed this system are: Dayton & Western Traction Company, Rochester (N. Y.) Railway & Light Company, Auburn & Syracuse Electric Railway, South Covington & Cincinnati Street Railway, East Liverpool (Ohio) Traction & Light Company, Rochester, Syracuse & Eastern Railway, Pittsburgh & Butler Railway.

Electric Railway & Tramway Journal, London, England, has issued a large bound diary for 1915. A preface to the diary contains a number of useful tables and data helpful to English and Continental electric railway practice, on such subjects as rails dimensions and weights, thicknesses and equivalent weight per foot for steel plates, town planning in relation to tramways and diameters, area, resistance and weight of aluminum conductors. In the diary section opposite each date of the year is given the proper lighting up time for English railway operators, which is one hour after sunset, Greenwich time. The greatest practical reference value of the diary consists in its directory section, which contains details of the personnel of British and foreign electric tramways.

Stone & Webster, Boston, Mass., have issued their 1915 analysis of electric railway, electric lighting, gas and water properties managed by the Stone & Webster Management Association. The book, which is leather-bound and eighty-four pages in length, contains information regarding the security issues of each one of the companies, the coupons, dividends, trustee and registrar of bonds, transfer agents, mileage, franchises, population, and earnings and expenses for the year ended Dec. 31, 1914. Maps of the leading properties are also inserted. At the back of the book there are placed tables showing coupons and dividends due, the earnings and expenses of all of the companies for the fiscal year, the approximate income from stocks paying from 4 to 10 per cent and 5 and 6 per cent bond interest yields.

Harrison Safety Boiler Works, Philadelphia, Pa., has issued a twenty-page pamphlet which describes the Sorge-Cochrane hot process system of softening boiler feed water. This process is based upon the fact that chemical reactions are more rapid and complete in hot water than in cold water, and the precipitate less soluble and coarser, so that it settles more rapidly. It is claimed that for these reasons more complete elimination of scale-forming matter is possible with an apparatus of a given size and with a given amount of excess reagent than if the water be treated cold, and that since the boiler feed water should be heated in any case, the hot process is the logical system to use for preventing scale in boilers. The fact, which has been deduced from reports by boiler inspection and insurance companies, that over fifty per cent of all boilers in use are defective by reason of the use of scale-forming water, should render this booklet of interest to owners and operators of steam power plants.

NEW PUBLICATION

Annuaire pour l'An 1915.—Published (in French) by Gauthier-Villars et Cie., for the Bureau des Longitudes, Paris, France; paper, 1 fr. 50c.

This French year-book, published as usual in pocket size, serves as an almanac for general scientific information and contains various tables on weights and measures and other statistical data.

Traffic Direction Block System of automatic signaling for Electric Railways



Scranton & Binghamton Railroad

This system is especially designed for the operation of interurban railroads. It combines the maximum of safety and efficiency with the least amount of apparatus.

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Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

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Electric Railway Lighting and Power Company Bonds
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New York Boston Philadelphia Chicago San Francisco

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Engineers.
115 BROADWAY
New Orleans NEW YORK San Francisco

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ELECTRIC RAILWAY ENGINEER
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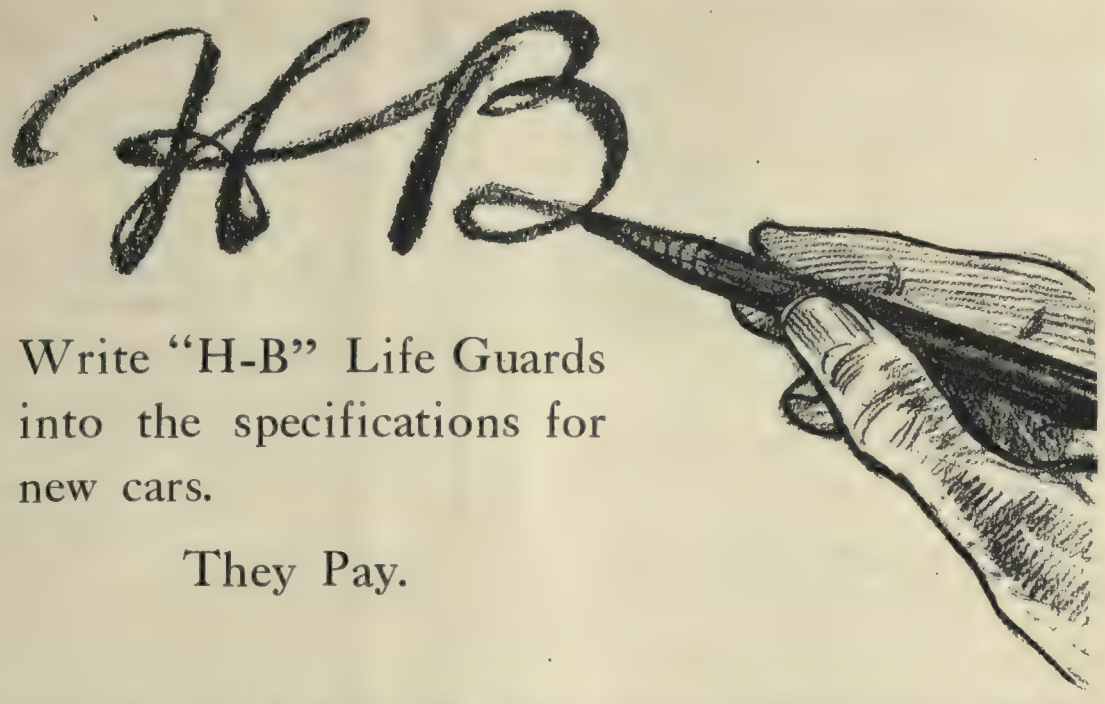
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Write "H-B" Life Guards into the specifications for new cars.

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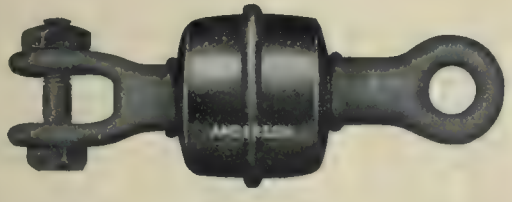
The Consolidated Car Fender Co., Providence, R. I.

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

381

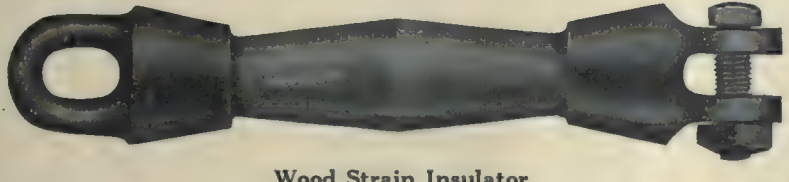
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Giant Strain Insulator

For service where severe mechanical strains are to be encountered, and where perfect insulation *must* be maintained under *all* conditions, we specially recommend Giant Strains. Made with malleable iron or steel terminals separated by high-grade sheet mica enclosed by a one-piece spherical steel shell and with the body entirely enclosed by Aetna Insulation, these strains afford a maximum of both mechanical and electrical strength.

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Wood Strain Insulator

are made with the malleable iron *inseparably compressed* upon the wood pin. These wood pins are made of selected second growth stock, cut and split to approximate size to get the benefit of the wood's full strength. Special treatment expells and excludes all moisture, thus preserving the life of the pin.

Write for the Anderson Catalog—every item a money-saving pointer.

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7244

WESTERN
CEDAR POLES
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CROSS ARMS
THE LINDSLEY BROTHERS COMPANY
"GOOD POLES QUICK" AVENARIUS CARBOLINEUM TREATED POLES SPOKANE, WASHINGTON

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Trolley Wire
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John A. Roebling's Sons Company
TRENTON, N. J.

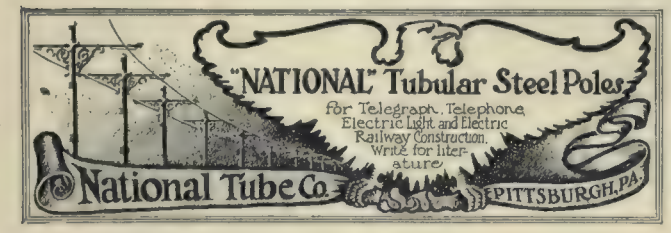
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Railway Feeders
And all kinds of Electrical Conductors
Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information
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Will Cut Your Wood Preserving Bills in Half
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NEW YORK
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TREATED POLES, CROSS ARMS, TIES, TIMBERS, PAVING BLOCKS
CAPACITY 100,000,000 FEET B. M. PER ANNUM
SEND FOR PAMPHLET
International Creosoting & Construction Co.
Address all communications to Office, Galveston, Texas
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Transmission Line and Special Crossing Structures, Catenary Bridges
Write for our New Descriptive Catalog.
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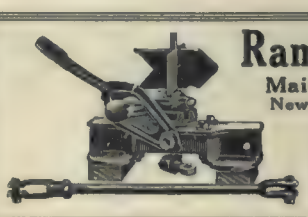
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1867 WOOD LETTENEY PRESERVATIVE 1915
Anthracene Oil of Highest Quality.
Carloads or less Shipped promptly.
THE NORTHEASTERN CO., BOSTON, MASS.





Diamond Tapered Steel Poles
save money
Diamond Steel Pole Co.
Philadelphia, Pa.

SHAW Overhead and Third Rail Insulation
Caps and Cones, Round Top Hangers, Globe Strains, Suspension Bolts, Feed Wire Insulators, Arc Lamp Hangers, Third Rail Insulators.
SHAW Lightning Arresters, Standard for 20 Years
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Ramapo Iron Works
Main Office, Hillburn, N. Y.
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Automatic Switch Stands, T-Rail Special Work, Manganese Construction, Crossings, Switches, Etc.

Universal Hangers
WITH THE REVOLVING STUD
Get the angle with the Trolley instantly. Lock the ear so it cannot work loose. Use any length ear with solid head.
Ask for sample.
THE W. R. GARTON COMPANY, CHICAGO

TOOLS
for all classes of electrical construction and repair work. Write for catalog.
Mathias Klein & Sons Canal Station 25 Chicago

The On-Time Advertiser

who gets his copy and cuts to us well before the day his advertisement should go to press, gets better type composition, better location and a better opportunity to make necessary corrections on the proofs which can then be submitted before publication.

The Last-Hour Advertiser

whose copy and cuts come in at the last minute or even later, gets the best attention we can possibly give him. We work overtime to do what we can for him. But the lack of sufficient time makes it physically impossible to do as well for him as for the advertiser whose instructions come in well before the last hour.

Get Your Copy and Cuts in Early

Do this, not on our account, but for the sake of your own advertising. We want to serve all advertisers equally well—but we can't put more hours into a day, and the advertiser who gives us the most time gets the best results.

Copy and cuts should be in our hands by Thursday of the week preceding the date of issue. This means that Thursday is the *last* day on which copy can be handled normally.

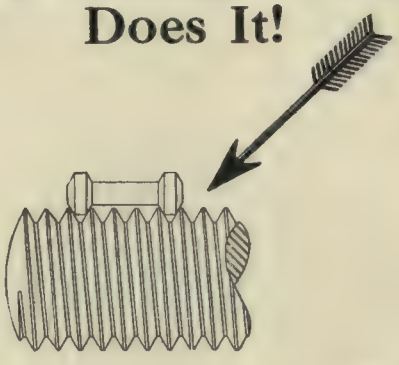
After that we cannot promise proofs, and we cannot insure classification.

For good advertising, get your cuts and copy in every week *before* Thursday.

Electric Railway Journal
239 West 39th Street, New York



This Rolling Wedge Does It!



That's the Reason for the Absolute Locking, Safety, Security and Economy of the

"ABSOLUTE" Lock-Nut

Observe the recess which has been cut across the nut at right angles to the threads. The floor of this recess slopes. Notice also the rolling wedge. When the nut is being applied the pin rests in a deeper part of the recess and rolls with the bolt.

The moment the nut starts to back, it immediately encounters the resistance caused by the rolling pin wedging itself into the higher level of the sloping floor of the recess. The result—all motion is stopped. The nut is locked absolutely. The greater the pressure tending to back the nut, the tighter it locks.

Vibration tightens the *Absolute*. Rust and dirt do not destroy its action.

Easily removed by inserting a common nail alongside the rolling wedge, preventing it from wedging.

It's as strong as any bolt. Write for results of tests.

The *Absolute Lock Nut* is nut and lock-nut, all in one. Saves in bolt length and time of application, as well as insures safety and certainty.

Costs no more than nut-locks. Write for catalog describing it.

The American Lock-Nut Co.
Pullman Station, Chicago

The Main Tracks

over which your entire output has to travel



Are Your Buses



One great aid in keeping this *Right of Way Clear* is to employ only bus supports of unquestioned reliability.

Our Bulletin No. 103 describes Bus Supports for every voltage and every conceivable condition of service. *They are guaranteed.* Write for it today.



Also if interested

Bulletin 101—Station and Pole Top Disconnects
Bulletin 102—Cable end Bells
Bulletin 104—Switchboard and Pipe Fittings, Clamps, Racks, etc.

Electrical Engineers Equipment Company
711-715 Meridian St., Chicago

"Aiming Excellence"

Write Our Nearest Agent
James C. Barr, Boston, Mass.; Lewis & Roth Co., Philadelphia, Pa.; The Hawkins-Hamilton Co., Inc., Lynchburg, Va.; Verne W. Shear & Co., Akron, O.; R. B. Clapp, Los Angeles, Cal.

Northern Electric Company
LIMITED
Distributors for Canada.

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Is Replacing "Pole Lines" in Most Every State
Facts and Figures in BOOK R
THE FIBRE CONDUIT COMPANY
ORANGEBURG, N. Y.
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Waving Arms—by day
Red Flashing Lights—by night
Clanging Locomotive Bell—day and night
Alone or in Combination Are What You Get In

The HOESCHEN CROSSING SIGNALS

Maximum Certainty and Safety—Minimum Installation and Maintenance Cost!
What are Your Requirements

Hoeschen Mfg. Co., Omaha, Neb.



PROTECTIVE
Highway Crossing Signals

Automatic—positive. Require no track circuits or bonding. Cost little to install—practically nothing to maintain.

Protective Signal Mfg. Co.
299 Broadway, New York 2

DISPATCHER **The Simmen System** MOTORMAN

Direct Contact Between
Dispatcher and Motorman
Write for Details
SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
1575 Niagara St., Buffalo, N. Y.



Street Railway Signal Co., Inc.
PHILADELPHIA, PA.
The first signal having official A. E. R. A. aspects.

Chapman
Automatic Signals
Charles N. Wood Co., Boston



Highway Crossing Signals
Visible and Audible Type Day and Night
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Ohio Signal Co. Canton, O.

FEDERAL SIGNAL CO.

Manufacturers / Engineers / Contractors } for { Automatic Signalling / Interlocking } either { A.C. or D.C.

No Interlocking Switches Are Safe Without Federal Switch Guards

MAIN OFFICE and WORKS - - ALBANY, N. Y.
103 Park Avenue, New York Monadnock Block, Chicago
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Crown Rail Bonds

Pin Driven

Designed for use underneath splice bars, where they are protected, and attached to webs of rails. Satisfactory for every requirement of severe service. Widely used and adopted by

The New York Central and Hudson River Railroad.
New York, New Haven and Hartford Railroad.
Pennsylvania Lines.
Southern Pacific Railroad.
Norfolk & Western and other roads.

We manufacture many forms of Crown Bonds to supply the demands for satisfactory single and double bonding. Can be furnished in different capacities, lengths, and fitted with any of the different types of our solid forged copper terminals; plain terminals for compression, tubular terminals for pin expansion, and tinned terminals for soldering.

The flexible conductors are made of fine stranded copper wires, specially cleaned and proof against oxidation. Welded by our special process to the terminals, this form of railway bond is declared the most superior bond on the market.

No tools except a hammer required to install.

Catalog with full description of our Rail Bonds and Appliances upon application at any one of our offices.

American Steel & Wire Company

Chicago, New York, Worcester, Cleveland, Pittsburgh, Denver. Export Representative: U. S. Steel Products Company, 30 Church Street, New York. Pacific Coast Representative: U. S. Steel Products Company, San Francisco, Los Angeles, Portland, Seattle.

1



This Shows One of the Many Uses Engineers and Contractors Find for

"ACME" (NESTABLE)

Corrugated NO-CO-RO Metal Culverts

Gave Satisfactory Service as a Temporary Sewer

These culverts are frequently used for Intakes, Outlets, Irrigation Ditches, Conduits, Casings for Electric Wires, Cables, Gas Mains, Water Pipes, Collapsible Forms, etc. You can build on, break-joint, section by section, without limit; and readily open up at any point by simply taking out a few bolts and removing a section or two. Catalog G-3 tells the story. A copy?

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Manganese Steel Center Layouts

BARBOUR-STOCKWELL CO.

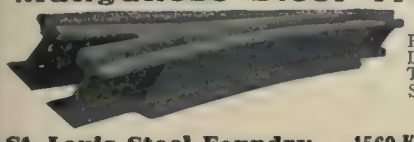
205 Broadway, Cambridgeport, Mass.

The Thew Electric Railway Shovel

was designed after a thorough investigation of the work to be done. It is especially adapted to the peculiar requirements of Electric Railway Companies.
Write for catalog "F" and list of Electric Railway Companies using Thews.

The Thew Automatic Shovel Co.
Lorain, Ohio

Manganese Steel Track Work



FROM THE LARGEST LAYOUT TO THE SMALLEST INSERT

(1)

St. Louis Steel Foundry, 1560 Kienlen, St. Louis, Mo.
Owned and operated by Curtis & Co. Mfg. Co., St. Louis.

Hundreds of Installations of



Falk Track-Work

are proving it worthy of your fullest consideration

Let us figure on your requirements

The Falk Company, Milwaukee, Wis., U. S. A.

Eastern Representatives: Wendell & MacDuffie Co., New York
Western Representative: Alphonse A. Wigmore, Los Angeles

Wherever There Are Steam Plants

you'll find that Dearborn Feed Water Treatment is saving money and trouble for the steam plant operators—year after year.

Our customers are numbered by thousands—we analyze over 8000 samples of feed water annually—and prepare treatment for the special conditions at each plant, that prevents the trouble caused by the boiler water, whether it be scale, corrosion, pitting or foaming.

No matter in what section you may be located, we have a satisfied user in your vicinity—we know we can prepare treatment that will end your boiler troubles.

Send us a gallon of your feed water—we will analyze and let you know the cost of proper effective treatment.

You'll save enough in repairs to more than pay for the treatment.

Dearborn Chemical Company

General Office, Laboratory and Works

Chicago

HIGHEST QUALITY

TRACK SPECIAL WORK



WE MAKE THIS GRADE ONLY

CLEVELAND FROG & CROSSING CO
CLEVELAND, OHIO

Special Track Work

Built along quality lines to withstand long, severe service.



Switches,
Frogs, Crossings,
Manganese Centers

New York Switch & Crossing Co.
Hoboken, New Jersey

The Babcock & Wilcox Company

85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

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DENVER, 435 Seventeenth St.
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LOS ANGELES, American Bank Building
NEW ORLEANS, Shubert Arcade
PHILADELPHIA, North American Building
PITTSBURGH, Farmers' Deposit Bank Building
PORTLAND, ORE., Wells-Fargo Building
SALT LAKE CITY, 313 Atlas Block
SAN FRANCISCO, 99 First Street
SEATTLE, Mutual Life Building

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

Kilby Frog & Switch Co.

BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and Special Work of all kinds for Street Railways.

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

ESTABLISHED 1882

The Weir Frog Company

Manganese Track Work

Cincinnati, O.

Repair Shop Machinery and Cranes

Built by

NILES - BEMENT - POND CO.

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago
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U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago Atlanta

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Selling Agents for Dunham Hopper Door Device—Feasible Drop Brake Staff—Columbia Lock Nut—Kling Bolts—Shop Cleaner—"Texoderm"—U. S. Metal Rail Filing Machine. *Sole Eastern Agents for* St. Louis Surfacer & Paint Co. *General Eastern Agents for* Hutchins Car Roofing Co.—Multiple Unit Puttyless Skylight—Car and Locomotive Jacks—Electric Arc Welders. *Special Agents for* The Tool Steel Gear & Pinion Co. *Special Agents for* C & C Electric & Mfg. Co. *General Agents for* Anglo-American Varnish Co.



This
Represents Cost
of Deltabeston
over Cotton Insulated Wire



This
Represents the
Savings Deltabeston
Effects in the Long Run

Which Will YOU Take?

The above is simply a graphic illustration of the "penny wise, pound foolish" policy of letting price stand in the way of using "DELTABESTON" MAGNET WIRE on your coils. "Deltabeston"—the wire with the tough, *permanently flexible, pure asbestos* insulation—saves coil failures—motor burnouts—stalled cars—rewinding expense. Because "Deltabeston" stands up where ordinary insulation breaks down. That's all. *Proof,* if you ask for it.

D & W FUSE CO.
Providence, R. I.

71826

Foster Superheaters

Insure uniform superheat at temperature specified

Power Specialty Company

111 Broadway, New York City

SKYLIGHTS

Without packing or filling substance—Of GLASS and METAL ONLY—ABSOLUTELY and PERMANENTLY PROOF AGAINST LEAKAGE. Send for details.
WE BUILD THEM RIGHT.

National Ventilating Co., 339 E. 26th St., New York

Murphy AUTOMATIC Furnace

RAISES the possibility of efficient stoking to a maximum.

Write for catalog "C."

MURPHY IRON WORKS
Detroit, Mich. U.S.A.

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DIXON'S BOILER GRAPHITE

Cleans Boilers and Keeps Them Clean
Send for "Graphite for the Boiler" No. 108

Joseph Dixon Crucible Company
Jersey City New Jersey 1

THE CUTTER ELECTRICAL AND MANUFACTURING CO. CIRCUIT I-T-E BREAKERS PHILADELPHIA

I. T. E. Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

PATENTED GECO APPLIANCES

GREEN CHAIN GRATE STOKERS

For Water Tube and Tubular Boilers

GREEN ENGINEERING CO.
1300 Steger Bldg. Chicago, Ill.

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Sent on application

A. G. E. LABOR SAVING MACHINES

For Armature Banding, Coil Winding, Taping, Pinion Pulling, Commutator Slotting and Pit Jacks, Armature Buggies and Armature Removing Machines

Manufactured by

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253 Broadway, New York, U. S. A.

WATER SOFTENING OR FILTRATION

FOR BOILER FEED AND ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

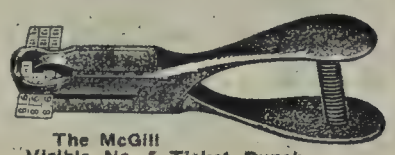
Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It

This Is the Punch for Rapid Handling of Transfers



The McGill Visible No. 5 Ticket Punch

When the platform of a car is crowded with entering passengers every second lost in fare collection counts heavily. "Blind" punches and punches that "stick" cost considerable loss of time in punching transfers. Equip your conductors with the McGill Visible No. 5 and note the difference. Samples sent for inspection and trial. Write for Catalog 25 J.

McGill Ticket Punch Co.
538 W. HARRISON STREET, CHICAGO

Trade Mark

Odorless Disinfectant
Keeps the air in a crowded car pure and sweet
Solves the Toilet Problem.
Write for information.
Gardner & Co., Joliet, Ill.



MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

KINNEAR Steel Rolling Doors
FOR CAR HOUSES
Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the
KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

IRCO FRICTION TAPES are the Standard
For Electric Railway and Lighting Use
Economy and Efficiency Combined
IMPERIAL RUBBER CO., 253 Broadway, New York, U. S. A.

Service and Durability — The Test of Economy
AMERICAN VULCANIZED FIBRE
will meet both requirements of this test if you will use it for Track Insulation.
Write for our Bulletin "For Safeguarding Safety Signal Appliances."
Send us blue prints of your fibre parts and let us quote you prices.
AMERICAN VULCANIZED FIBRE CO., WILMINGTON, DEL.

IMMEDIATE DELIVERY ON
DISFICO
Fibre Track Insulation
Order from our Chicago or Elsmere factory, whichever is nearer, and delivery will be made without delay.
Include an order for Disfico Horn Insulation for repair work
DIAMOND STATE FIBRE CO.
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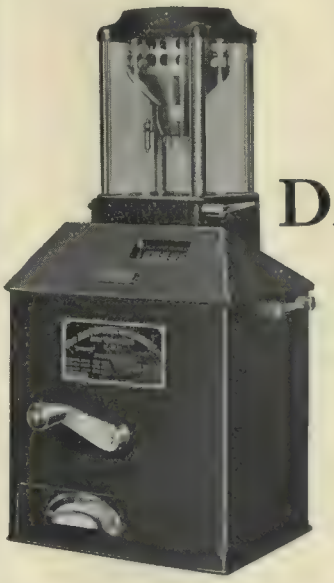
SAFETY FIRST



Always ready for use.
Takes both tickets and cash fares.

CLEVELAND FARE BOX CO.
CLEVELAND, OHIO

Insure Your Income



The DAYTON FARE BOX checks your income at its source. It insures that there is no leak. It gives no chance for error.

DAYTON
Fare Box

receives and registers 1-cent, 5-cent and 10-cent pieces in United States money and Canadian dimes and half-dimes. It is a rugged, simple mechanism that is practically indestructible and infallible.

Write for data and our free trial proposition.

The Dayton Fare Recorder Co.
Dayton, Ohio

980

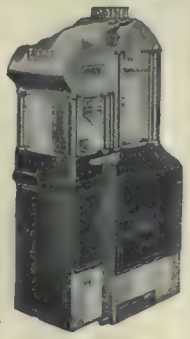
The JOHNSON Registering Fare Box



For Cash Fares

—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.

Johnson Fare Box Company
Jackson Blvd. and Robey St.
CHICAGO
30 Church St., NEW YORK



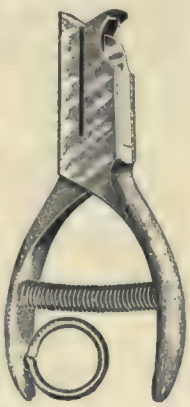
For Cash Fares and Tickets

For Speed and Durability

B-V Visible Punches

The visible feature and tool steel dies of the finely finished B-V Punches make them Leaders. Their durability and speed of operation cannot be duplicated.

Write for catalog.



BONNEY-VEHSLAGE TOOL CO.
124 Chambers St., New York
Factory, Newark, N. J.

71696

The Eclipse Railway Supply Co.
CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD — **ECLIPSE WHEELGUARD**
ECLIPSE TROLLEY RETRIEVER — **ACME FENDER**

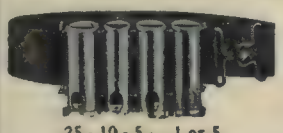


INTERNATIONAL SPECIALTIES TALK FOR THEMSELVES

Registers and Register Fittings, Badges, Punches, Bell and Trolley Cord.

THE INTERNATIONAL REGISTER CO.
15 SOUTH THROOP ST., CHICAGO

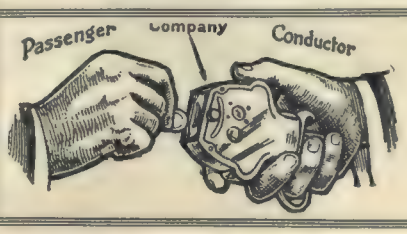
IN A WORD
THE RAPID READY CHANGE CARRIER



25 - 10 - 5 - 1 or 5

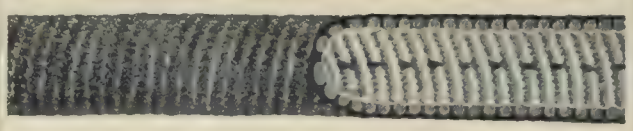
enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, $1.75.

CHAS. F. ETTER
904 N. 2nd St., Harrisburg, Pa.



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.



Note the single wall construction—nothing to break, blister, pull apart or collapse.

IF you are using any other type of conduit than Duraduct for your lighting and heating systems, you are wasting money.

DURADUCT

Reg. U. S. Pat. Off.

Flexible Non-Metallic Conduit will give 100% in efficiency—saves 66 2/3% in cost—and 85% in weight. It is also easier and cheaper to install.

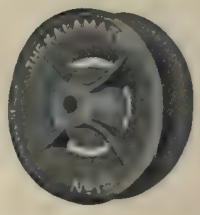
Tubular Woven Fabric Co., Mfrs., Pawtucket, R. I.

A. HALL BERRY, General Sales Agent

97 Warren St., New York 309 So. Desplaines St., Chicago

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

More-Jones Trolley Wheels To Fit ALL Harps



Many roads prefer them because they get improved trolley wheel service without the necessity of changing harps. This facilitates standardizing of equipment at the same time that it saves expense. Travelling at high speed, these perfectly balanced wheels are less liable to chatter or vibrate. This is one of the several reasons why More-Jones Trolley Wheels give such satisfactory service. Made in 48 styles and sizes.

More-Jones Brass & Metal Co., St. Louis, Mo.

2

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York People's Gas Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.



Light Weight Steel Seats

save the drain on current at "traffic peaks."

WALKOVER

Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

Hale and Kilburn Company

New York Philadelphia Chicago

The Peter Smith Heater Company leads the world on heating City and Interurban Electric cars of all sizes and makes. Ask us to prove this statement. We have the experience back of us.

PETER SMITH HEATER COMPANY

1759 Mt. Elliott Ave., Detroit, Mich.

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

MAKE THE BEST

THE RAILWAY SUPPLY & CURTAIN CO.

CHICAGO

CAR CURTAINS & FIXTURES FOR ALL PURPOSES

CATALOGUE ON REQUEST

"UTILITY" Electric Thermometer Control SAVES 70% In Heating Current

"UTILITY" Ventilators Represent the Highest Efficiency—Various types to Meet All Conditions

RAILWAY UTILITY CO. Chicago and New York



Buckeye Emergency Jack No. 239

An extra powerful and handy Jack for extra difficult jobs.

Forged Parts are Special Heat Treated

This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

The Buckeye Mfg. Co.
Alliance, Ohio

7180 1

BRAKE SHOES

The Brake Shoe Business

No one man can know more than a small portion of the vast fund of information relating to brake shoe design, construction and application. But *collectively* the members of the American Brake Shoe and Foundry Company know a great deal about brake shoes and braking. Our knowledge has saved thousands of dollars to many electric railways. We are at *your* service.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71607 1

TULC

WE WANT YOUR BUSINESS
IT DOES NOT MATTER
How Large or How Small Your System is
IT DOES NOT MATTER
Whether Your Cars have Old or New Equipment
TULC WILL SHOW A SAVING ON ANY TYPE OF EQUIPMENT IF GIVEN A TRIAL.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.



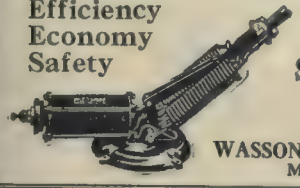
The Simplified Slack Adjuster

When the shoe wear is sufficient to require it, steel shims dropping down behind a bifurcated push rod forming the brake lever fulcrum insure the simple, positive action of the S-W Brake Adjuster. WRITE FOR THE FOLDER.

The Sauvage-Ward Brake Co., Inc.
Whitehall Building, New York
9381

UNION SPRING & MANUFACTURING CO.
SPRINGS COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office, Oliver Bldg., PITTSBURGH, PA.
Works: New Kensington, Pa.
149 Broadway, New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

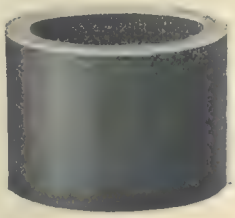
Efficiency
Economy
Safety



A WASSON
TROLLEY BASE
Soon Pays for Itself
Order One Today
and Convince Yourself
WASSON ENGINEERING & SUPPLY CO.
MILWAUKEE, WISCONSIN

LONGWEAR BUSHINGS

Hardened Steel Accurate Uniform



Dimensions Exactly as You Specify

E.G. Long Company
50 Church Street New York

SEARCHLIGHT SECTION

FOR SALE

10—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
30—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Trucks.
2—Jackson and Sharp 18′ Bar Bodies.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
10—Wason 10 Bench Open Cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 Bench Open Cars, West. 12A Motors, Brill 21E Trucks.
8—Brill 14 Bench Open Cars, West. 56 Motors, Brill 22-E Trucks.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars complete, 4 G.E. 1000 motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
20—G.E. 80 Railway Motors complete.
12—G.E. 54 Railway Motors complete.
60—G.E. 1000 Railway Motors complete.
60—G.E. 800 Railway Motors complete.
40—West. 12A Railway Motors complete.
32—West. 49 Railway Motors complete.
8—West. 38B Railway Motors complete.
10—West. 112 Railway Motors complete.
4—West. 68-C Railway Motors complete.
4—West. 68 Railway Motors complete.
12—G.E. 73 Railway Motors complete.
24—G.E. 87 Railway Motors complete.
20—G.E. 57 Railway Motors complete.
3—West. 101-B2 Armatures, brand new.
3—West. 93-A2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
22—K6 Controllers.
44—K11 Controllers.
28—K2 Controllers.
62—K10 Controllers.
30—K14 Controllers.
28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheel base.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheel base.
10—Dupont Trucks, 7′ 6″ wheel base.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street, NEW YORK, N. Y.

MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.
2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

An Unusual Bargain

One double truck, single track snow plow, length over all 40 ft., width 8′6″, height 10′9″, truck centers 13′8″. wheel base 4′. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

Price $1,000, F.O.B. Rensselaer, New York.

Albany Southern R. R. Co.

Rensselaer, N. Y.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

FOR SALE

Two Snow Plows: One Sprinkler: Cars, Motors, Rails, Generators. Everything for Track, Rolling Stock, Power Plant bought and sold. Send us your requirements.

Write for our Lists and Catalogs.

Railway & Power Equipment Co.

Charles F. Johnson P. O. Box 155 Ellicott Sq., Buffalo, N. Y.

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

150 K.W. Motor Generator Set

1—220 H.P., 3 phase, 60 cycle, 2080 volt, 514 R.P.M., General Electric induction motor, direct coupled to 150 K.W General Electric, 550 volt, CLB, compound wound generator. Instant shipment.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.

Complete with coupling and panel.

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

4—West. 112 Motors, 75 H.P., newly rewound.
5—Type M, Single End Control for 4 motors, 75 H.P. ea.
2—K. 14 controllers.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338-4339 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

HIGH grade man desires position as secretary or assistant to busy executive. Fully experienced and thoroughly trained in management of various departments. At present operating official of system of city and interurban lines. Age 35, health good and am willing to go anywhere. Address Box 694, Elec. Ry. Jour.

MAN, 37, 7 years' electric railway experience handling material and shop accounts, shop payrolls, etc., wishes to change. Thoroughly conversant with stores systems; no objection to leaving New York. Box 698, Elec. Ry. Jour.

MASTER mechanic, 14 years' experience with city and interurban railways. Capable of installing and upkeeping all kinds of equipment, solicits correspondence with railway company needing same. Box 699, Elec. Ry. Jour.

MASTER mechanic open for immediate engagement. Long experience, reliable and unquestioned ability. Best references. Box 684, Elec. Ry. Jour.

POSITION wanted by a man who has had 18 years' experience as superintendent and roadmaster and constructing street car lines. Best references. Box 691, Elec. Ry. Jour.

SECRET service work; several years' experience. Traffic and register inspections, platform service, both street car and interurban. At liberty after March 30th. Best of references from Middle Western properties. Age 27, married. Box 693, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.	11.60
1-4 page,	20.00	8 in. single col.,	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

STOREKEEPER, thoroughly acquainted with all electric railway material and accounts, desires change. Can cut the mustard in regard to efficiency and economy. Box 674, Elec. Ry. Jour.

WANTED—A position as barn foreman or master mechanic of a road of about 75 cars. Strictly sober; 15 years' experience in remodeling old cars; also equipping new cars. Can give past and present references. Can come at once. Box 682, Elec. Ry. Jour.

WANTED—By a thoroughly up-to-date, reliable and competent man, 40 years of age, experienced in all branches of railway operation and maintenance, position as superintendent or superintendent of equipment. Best of references, past and present. Correspondence solicited concerning any good opening. Box 697, Elec. Ry. Jour.

YOUNG man desires position as auditor of electric railway company. At present so employed. Best of references. Box 679, Elec. Ry. Jour.

POSITIONS VACANT

SALESMAN wanted, one who sells to wholesale plumber and hardware suppliers, to sell machinery cotton waste. Box 695, Elec. Ry. Jour.

FOR SALE

Chestnut Poles For Sale

We furnish A, B, C and E grades in any length, 20′ to 75′ and stubbs, chestnut poles and R.R. ties, locust posts and hardwood lumber and timbers. A good stock of poles on hand. Can make prompt shipments. Address Lewis Lumber Co., Relief, N. C.

25-Tons 6″ HIGH "T" RAILS

POLES AND PILING

NEW CYPRESS. PRICES LOW.

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
St. Louis

New and Relaying Rails,—Equipment—Tanks—Etc.

The Classified Advertising in Electric Railway Journal

is read carefully by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand dinky engine at a moderate price, an expert draftsman or superintendent, or the services of a firm of engineers for designing a large modern plant.

The Best Proof

of this is the regularity with which such advertisements are carried—the extent and variety of the JOURNAL'S want ads. Without a constant and appreciable *demand* for such machinery or services, by the JOURNAL readers, the market-place which these advertisements represent could not exist for any length of time.

Electric Railway Journal
239 West 39th St. New York City

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Grelms Corporation, H. E.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Architects.
Kennard, Ralph B.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Protective Signal Mfg. Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.

Bearings, Oilless, Graphite, Bronze & Wood.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Protective Signal Mfg. Co.
Reiter, G. C.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Imp. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Creaghead Engineering Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Sauvage-Ward Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Brazing. (See Welding.)

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite & Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.
Wasson Engrg. & Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Chas. F. Etter.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
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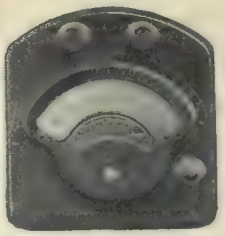
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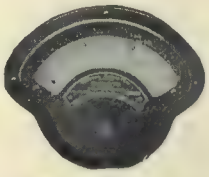
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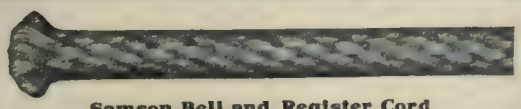
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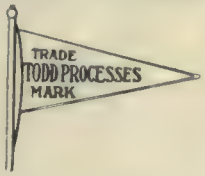
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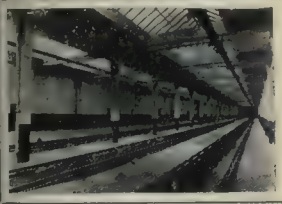
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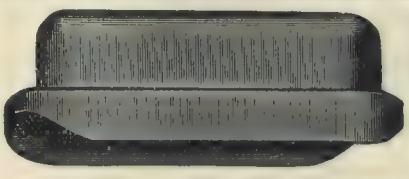


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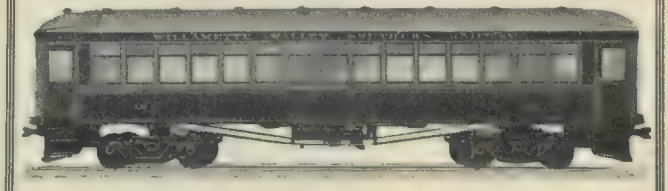
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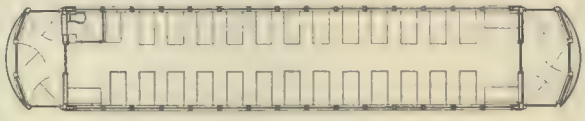
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Motor Bearings

maintain the armature absolutely central within the fields and thus insure uniformly high motor efficiency and greatly reduces the cost of maintenance. Thus in connection with the reduction of current consumption, friction and lubricating expenses

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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TITANIUM IN RAIL STEEL

No. 15

The White-Souther Endurance Test

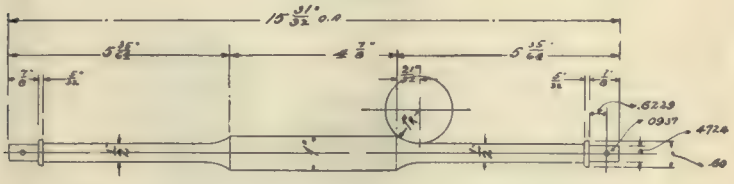


Courtesy Tinius Olsen & Co.

Results of Tests on 17 Standard and 17 Titanium-Treated Open Hearth A-Rails—reported in Bulletins 1 to 7, inclusive.

STANDARD OPEN HEARTH White-Souther Endurance	TITANIUM-TREATED OPEN HEARTH White-Souther Endurance
2,689,000	25,281,800
12,122,700	30,000,000
9,799,750	†No Test
9,947,300	30,000,000
30,000,000	22,473,750
17,478,150	30,000,000
27,880,150	28,951,100
29,843,450	22,137,800
38,622,950	40,000,000
26,716,150	30,445,700
40,000,000	31,753,400
40,000,000	40,000,000
40,000,000	40,000,000
193,500	104,100
306,200	28,200,450
872,000	13,169,850
Average, 20,404,456	Average, 27,501,196

TEST PIECE



HOW THIS TEST IS MADE

The test piece for the White-Souther machine is of special shape and is held rigidly in the axis of a wheel, which is revolved at a speed of 1,300 revolutions per minute, and the ends of the piece projecting on each side of the wheel are loaded with weights which hang constantly downward. Each complete revolution of the wheel thus involves two reversals of stress in the specimen. A counter on the machine records automatically the number of hundred revolutions endured before fracture, and this number gives an estimate of the steel's resistance to fatigue. Since the stresses used in this test are always well below the elastic limit of the steel, it is the nearest approach of any test to the conditions of actual service.

Note that average increased endurance for Titanium-Treated Rails is approximately 35%—very nearly the same as average increased life in Service Tests.

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3449

"Competent counsel cannot come from one man. All around us are the laws of the universe. Counsel, direct or indirect, is wanted *from each man who knows the most*, so that we may not be floundering along on last week's, last month's, last year's, last decade's or last century's knowledge, but use special knowledge, today the possession of the few, but destined to become world practice."
HARRINGTON EMERSON

The italics are our own. Galena Expert Service is ready to send men who know most about the proper LUBRICANTS and proper LUBRICATION,

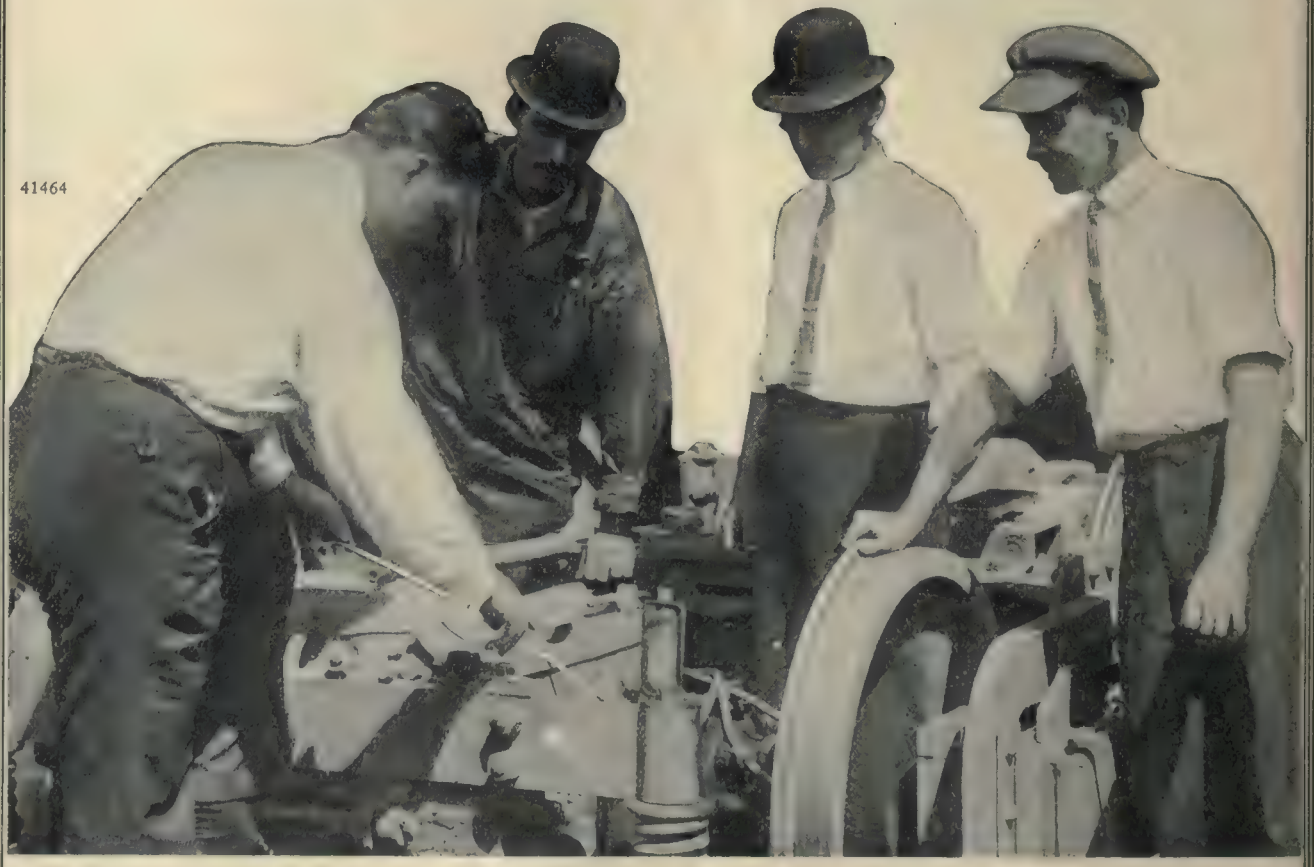
—*to work with your men* until doing the right things, at the right time, in the right way, becomes a fixed habit,

—and to undertake all this on a basis of GUARANTEED SAVINGS.

Have you seen a Galena Contract? Write us.

Galena Signal Oil Co., Franklin, Pa.

41464



BRILL CENTRIFUGAL SPRINKLING CAR



WHEN the summer schedule is in force and all the available cars are on the lines, each dragging a cloud of dust after it, bringing discomfort where otherwise would be found the most comfortable place on a hot day; then is the time that sprinklers make trolley riding a pleasure and attract many extra riders from sultry streets and suffocating rooms to the breezy cars. But to run sprinklers in between strings of cars without slowing up the running time, is the problem; or rather, it used to be a problem, because in these days there is a power sprinkler that can thoroughly sprinkle a wide street from curb to curb while running at the same speed as passenger cars. The Brill Centrifugal Car is the machine that will do the work and do it efficiently. Ten years of operation on many systems at home and abroad have made sure its entire practicability under all operating conditions. The motor-driven centrifugal pump supplies a uniform pressure at the sprinkling heads, which may be adjusted for any range and amount; gate valves stop the water instantly at crossings without changing the adjustment. There is no possibility of the pump heating up and the whole apparatus has so few wearing parts that maintenance costs are practically nil. Single and double-truck sprinklers with tank capacity of from 2,100 to 4,200 gallons are shown in the Brill Centrifugal Sprinkling Car catalog. Write for a copy.

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WASON MANUFACTURING CO.
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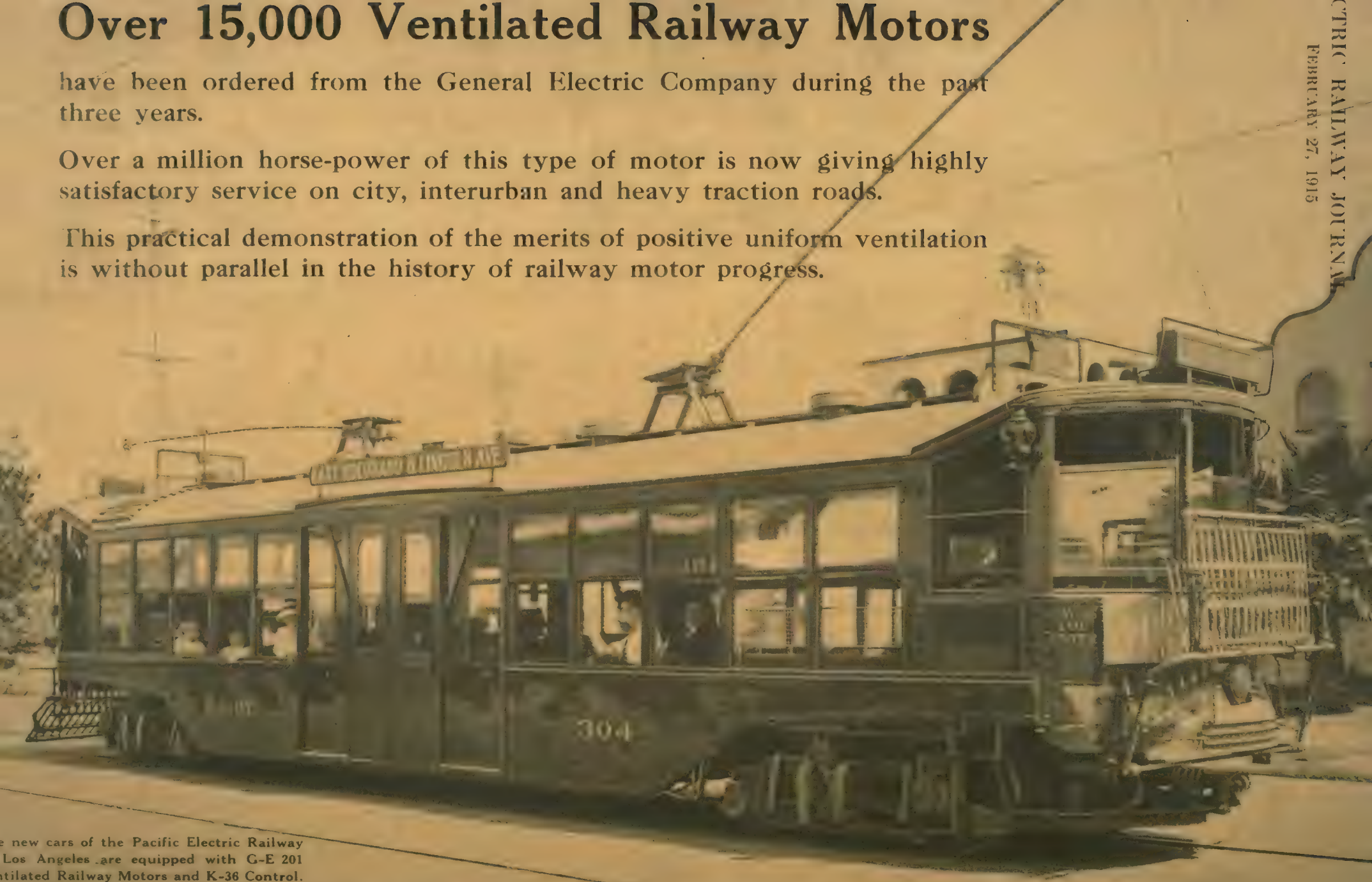
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have been ordered from the General Electric Company during the past three years.

Over a million horse-power of this type of motor is now giving highly satisfactory service on city, interurban and heavy traction roads.

This practical demonstration of the merits of positive uniform ventilation is without parallel in the history of railway motor progress.



e new cars of the Pacific Electric Railway Los Angeles are equipped with G-E 201 ntilated Railway Motors and K-36 Control. nilar equipments are in service in San e, Fresno and Stockton, California.

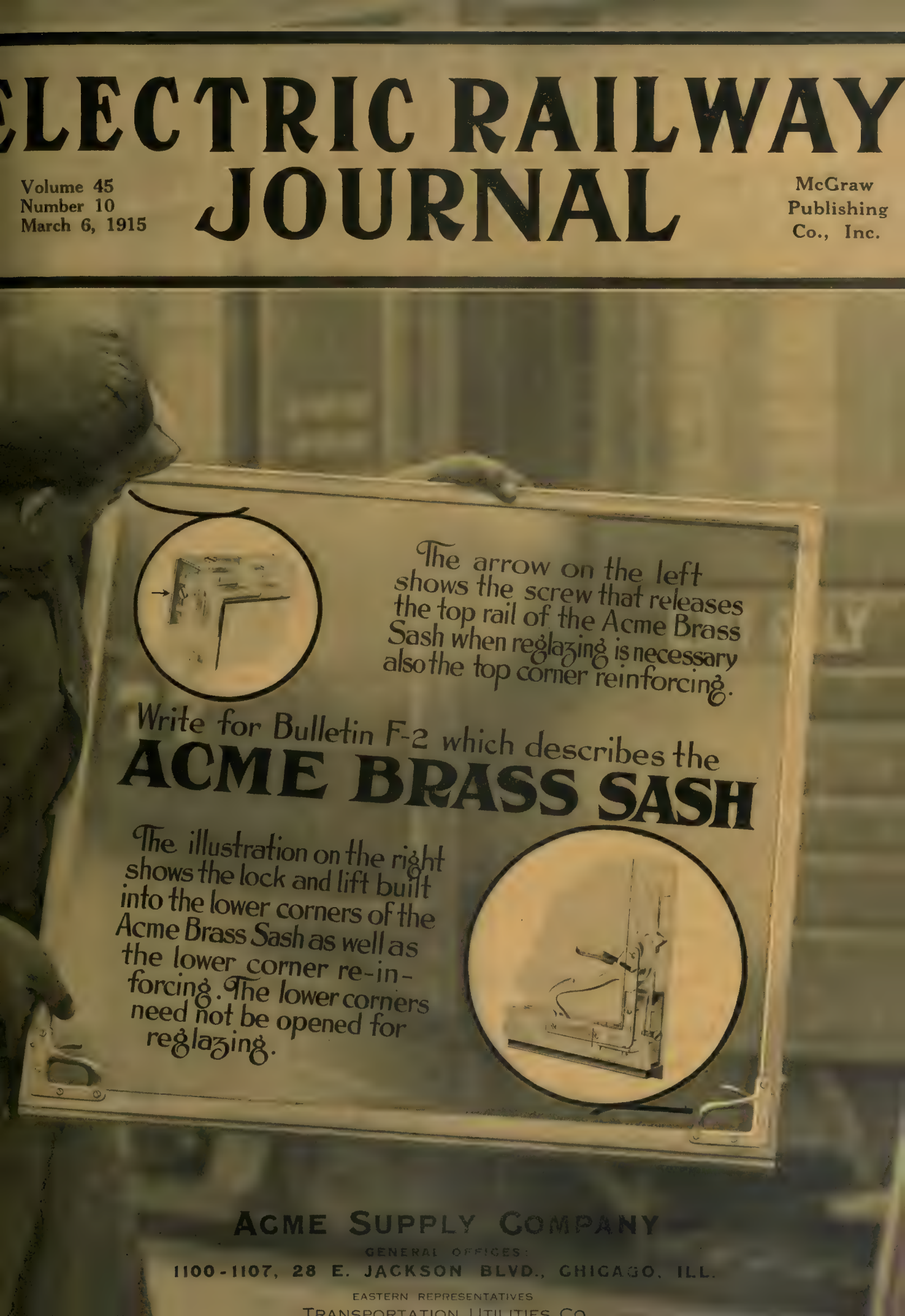
General Electric Company

ELECTRIC RAILWAY JOURNAL
FEBRUARY 27, 1915

ELECTRIC RAILWAY JOURNAL

Volume 45
Number 10
March 6, 1915

McGraw Publishing Co., Inc.





A Comparison

"HERE'S that report you asked for," said Joe, the Superintendent, to the General Manager, "showing the difference in maintenance cost between our old motors and the new Westinghouse Motors we have in service on our city cars. It shows the new motors cost about $8.90 less to maintain per 1000 car miles. The figures are:

Old Motors....	$9.16	per 1000 car miles
New Motors....	.232	per 1000 car miles
Difference	$8.928	per 1000 car miles

"According to those figures, Joe," said the General Manager, "our new motors almost pay for themselves every eighteen months as compared with our old equipment, based upon 30,000 car miles per year, which is the average for our city cars. I had no idea the saving was so great. At our next board meeting I will strongly recommend getting rid of all our old motors and equipping our cars throughout with new Westinghouse Motors. It's a paying proposition."

Westinghouse Electric & Manufacturing Co.

Sales Offices in all large American Cities

East Pittsburgh Pennsylvania

Electric Railway Journal

New York, March 6, 1915

Volume XLV No. 10

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Pages 447 to 492

Some Results of Italian Three-Phase Electrifications 450

G. Pontecorvo shows from operating curves and statistics of the original Giovi three-phase electrification that regeneration in practice has saved $19,000 a year at the coal pile regardless of brakeshoe and other savings.

ELECTRIC RAILWAY JOURNAL, March 6, 1915. 9 cols. Ill.

Annual Convention of C. E. R. A. 455

The sessions on Friday were devoted to a discussion on safety and to business matters. Abstracts of papers read at both sessions are published.

ELECTRIC RAILWAY JOURNAL, March 6, 1915. 13 cols.

Syndicated Anti-Railway News 462

An account of how some daily newspapers get their "news." Anti-railway material sent out as "features" for local paper reproduction.

ELECTRIC RAILWAY JOURNAL, March 6, 1915. 3½ cols. Ill.

Twentieth Quarterly Meeting of N. Y. E. R. A. 464

At the Lake George meeting held March 2 and 3, the main topics discussed were maintenance and fare collection.

ELECTRIC RAILWAY JOURNAL, March 6, 1915. 7½ cols.

Communications 468

Rational Units for the Boiler Room. Uniformity in Car Colors.

ELECTRIC RAILWAY JOURNAL, March 6, 1915. 1¾ cols.

Equipment and Its Maintenance 469

Removing Snow from Under-Running Third-Rail—*By F. L. Hinman.* High-Voltage Third-Rail Construction—*By A. H. Tracy.* Painters' Putty for Repairing Controller Division Plates—*By R. H. Parsons.* Power Dispatching—*By G. L. Fitch.* Linemen's Non-Electric and Electric Searchlights. Fire-Fighting Car at Duluth. London Ticket-Selling Machine. Illuminated Guide Signs in England. Non-Arcing Harp and Oil-less Bushing. Double-Throw Horn Gap Switch. Winch for Pole Handling. A One-Man Rail Grinder.

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INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

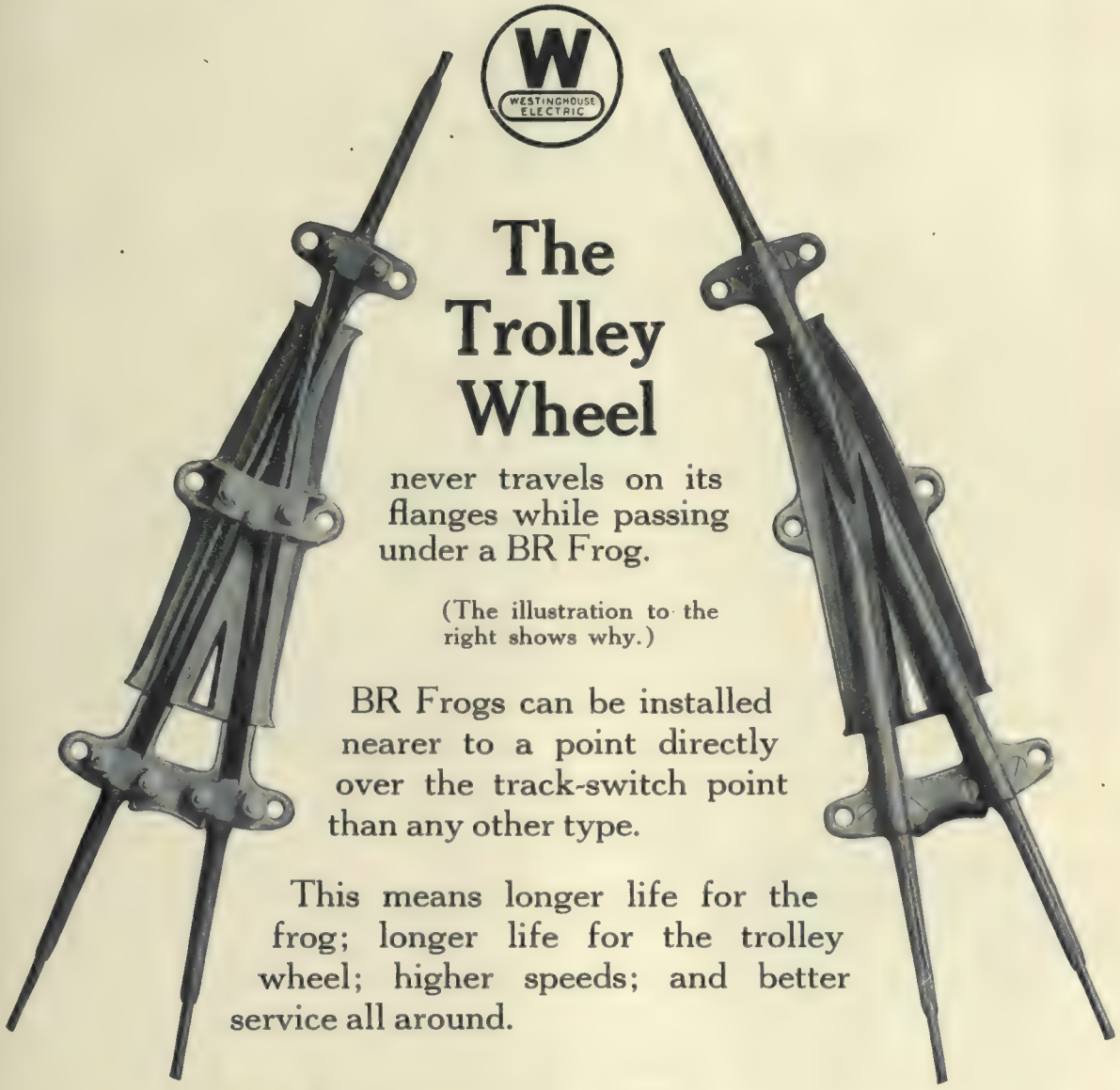
Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

Westinghouse
Type BR Trolley Frog



The Trolley Wheel

never travels on its flanges while passing under a BR Frog.

(The illustration to the right shows why.)

BR Frogs can be installed nearer to a point directly over the track-switch point than any other type.

This means longer life for the frog; longer life for the trolley wheel; higher speeds; and better service all around.

Prove these statements by putting one in service

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W. Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
*Dallas, Tex.
Dayton, Ohio.
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
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Louisville, Ky.
Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
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Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio.
Washington, D. C.
*W. E. & M. Co. of Texas.

PUBLISHER'S PAGE

One Feature of One Department of the Electric Railway Journal

"Equipment Defects"

By C. W. SQUIER, E. E.

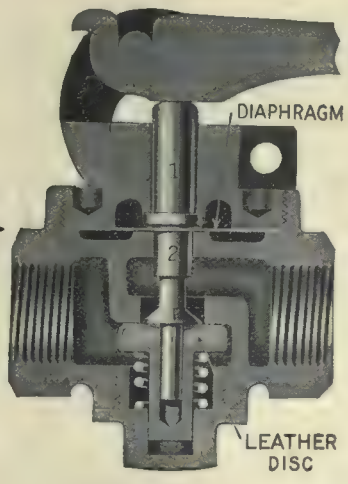
(Contributed to the Department on "Equipment and its Maintenance")

1. Records of those caught in operation or at inspection
2. The Trolley Wheel
3. Trolley Poles
4. Trolley Bases
5. Contact Shoes
6. The Contact Plow
7. Circuit Breakers and Hood Switches
8. Determining the character of armature winding
9. Fuses, Fuse Blocks and Fuse Boxes (1)
10. Fuses, Fuse Blocks and Fuse Boxes (2)
11. Control Apparatus and Connections
12. Grouping Motors
13. Changing Motors from series to parallel
14. The Bridging Method of Transition
15. Controllers for Electric Braking
16. Increased Size of Motors for Rheostatic Braking
17. Connections for Backward Braking

Seventeen articles equivalent to a 6 in. x 9 in. book of 70 pages on the vital question of properly selecting and properly maintaining the current-conducting apparatus of the car.

The articles by Mr. Squier, who is the electrical car trouble expert of one of our largest systems, will be continued during the year 1915. No railway man interested in car maintenance should miss one installment. Watch for them. Read them.

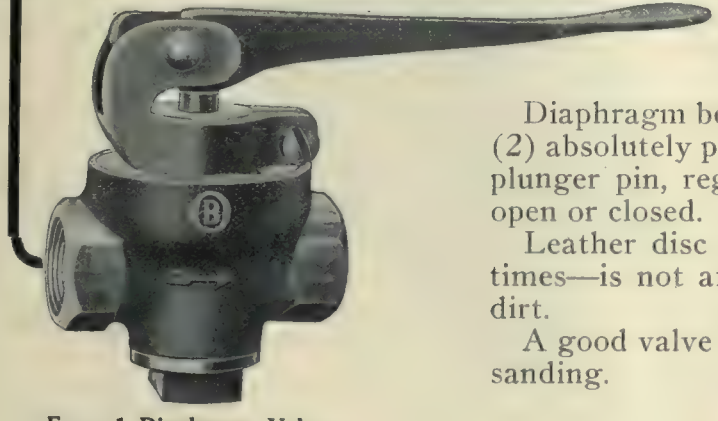
Make the Most of Them



Sectional View

The Diaphragm Sander Valve

An Exclusive Feature of O-B Equipment



Form 1 Diaphragm Valve
Patented

Diaphragm between plunger (1) and stem (2) absolutely prevents leakage of air around plunger pin, regardless of whether valve is open or closed.

Leather disc closes tightly on seat at all times—is not affected by small particles of dirt.

A good valve is essential for successful air sanding.

O-B Air Sand Trap

A compact and efficient trap that can be placed at any convenient location on car where hose will reach rails.

Sand cannot get out except by application of air.

Easily cleaned.



See pages 519-522 of Catalog No. 14 for full listing.

The Ohio Brass Co., Mansfield, Ohio

30 Church St., New York 306 Fourth Ave., Pittsburgh 343 So. Dearborn St., Chicago
Holabird-Reynolds Co., San Francisco and R. D. Holabird, Los Angeles — California Agents

Here's the Biggest Improvemen in Trolley Harps ever Announce

The new, perfected "V-K" OILLESS TROLLEY WHEEL and "V-K" NON-ARCING HARP have just been added to the well-known MORE-JONES Line.

They mark an improvement in Trolley Equipment so complete, effective and practical in its nature that their superiority over other types and designs is beyond question.

That the "V-K" type of trolley wheel and harp gives better service, with reduced operating and maintenance expense, has been proved to be a fact, and this is capable of conclusive demonstration by any test you may devise.

This



The Ideal Combination

The

V-K

NON-ARCIN HARP

This type of harp used with the "V-K" OILLESS WHEEL, provides the best form of contact yet invented. It enables the current from the wheel to be taken right through the bearing without loss or interruption from arcing. The contact springs, while they serve to facilitate the flow of current, also act as cushions and prevent excessive shocks and dewirements of the wheel. This is a factor of considerable importance in increasing the life of both wheel and harp.

The distinctive and patented feature of this harp is the "V-K" gripping device. By means of this, the axle-pin is firmly held and locked, thus preventing arcing, which is the inevitable result of operating with loose or badly fitting pins.

It simplifies the removal of the axle-pins when wheels are changed—is quickly operated—requires no inspection when set—cannot work loose.

Here's the Biggest Improvement in Trolley Wheels ever Announced

The "V-K" OILLESS TROLLEY WHEEL has been directly designed to eliminate the defects found in all other types of trolley wheels used in common practice.

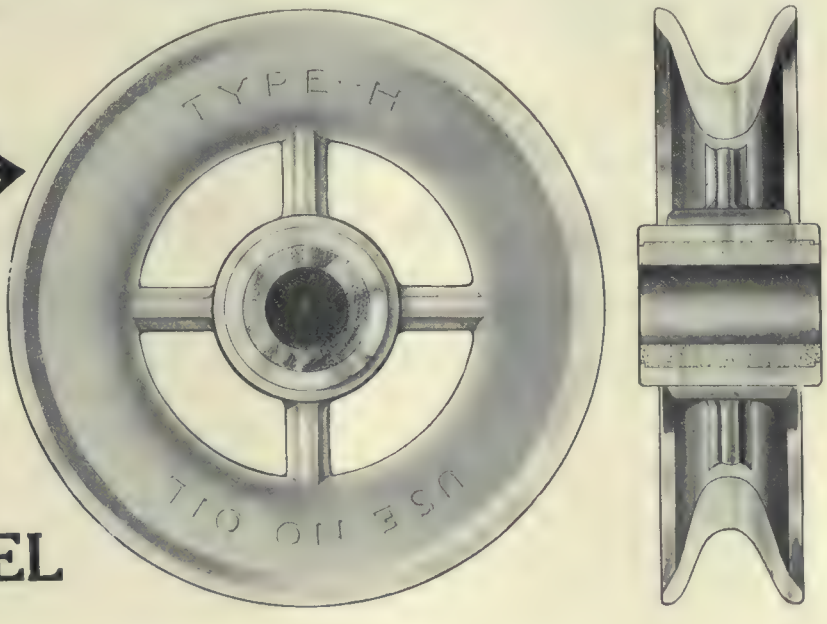
The most distinctive feature this type possesses is the power of permanent self-lubrication. This is due to the use of the Simpson patent graphite and gauze bushing, which is also heat-proof and almost indestructible. The bushing is interchangeable, easily removed when desired.

By reason of this self-lubrication, there is no oil or grease around the bearing to interfere with the free flow of current through the "V-K" WHEEL. Once installed it requires no attention, will run until worn out, and this in itself constitutes an economy of a very considerable nature.

The "V-K" WHEEL is made of special metal, perfect in texture, tough and durable, and properly balanced. Its quality of conductivity is the highest obtainable; it operates with the minimum of destructive wear upon overhead construction and maintains perfect and continuous contact with the wire at the highest speeds.

with This →

The V-K OILLESS TROLLEY WHEEL



The MORE-JONES Line has always stood for progressiveness in ideas, expert research and concentrated effort towards improvement in designs and sound, practical knowledge pertaining to the field of Trolley Equipment.

We make this Announcement in the firm conviction that "V-K" OILLESS TROLLEY WHEELS and "V-K" NON-ARCING HARPS are all that we claim them to be—and more. We invite correspondence, inspection, test.

Send for our new illustrated Catalog, now on the press. It contains full information on sizes, prices, etc., covering our whole line.

More-Jones Brass & Metal Co., St. Louis, Mo.



Reduce Your Maintenance Forces Put a BROWNHOIST at Work

Did you ever calculate how much saving a Brownhoist Work-Car Crane would make on your roadway and construction costs? Ask the companies who are using the Brownhoist Crane.

The upper picture shows the Pittsburg Railway Co. Crane fitted with a hook block for handling dump buckets, rails, ties, cross-overs, poles, timbers and other construction material.

The Cleveland Railway Co. has two of these Brownhoist Cranes. The one below, which is shown with the grab bucket, has proven economical in handling sand, gravel, crushed stone, cinders, coal, etc.

And the Brownhoist WORK-CAR CRANE handles its own work trains, being self-propelling.

Send for catalogue "I," which shows how and where some of these cranes are used.

The Brown Hoisting Machinery Company

Cleveland, Ohio



9618



E. R. J.

The Chemistry of Car Painting

is a comparatively new science which recognizes the fact that climatic and atmospheric conditions, character of service and materials of construction are big factors in determining the kind of paint and varnish that should go on your rolling stock. Whether you paint your cars as plainly as a house or as Stradivarius varnished his violins, your end is to get the greatest service for the least money. The factors that affect painting perfection and economy are so many that you cannot settle them by adopting so-and-so's materials and colors just because they made good on some other railway.

Aside from analyses of your paints and varnishes to protect you against adulteration

Our Painting Service

will study your case from other standpoints. The analyses alone may save you $20 to $30 *per car,* but this gain is small compared with the reduction possible in paint shop time by substituting, say, the oil and varnish method, or baking, for the old lead and oil process. Further, a close relation exists between

Car Washing Methods and Paint Life

so that a study of your washing compounds and temperature conditions in washroom and paint shop may lead to surprising economies.

Again, only the painting specialist can best determine what pigments and shades will retain their splendor for years and what ones will accentuate dirt five minutes after they leave the paint shop.

The Painting of Steel Cars

is still another problem that can be solved best only by the aid of an organization which combines and harmonizes the knowledge of the chemist in paints and of the engineer in car structures. Competent advice regarding car painting practice is only one angle of the service our technical experts are prepared to render.

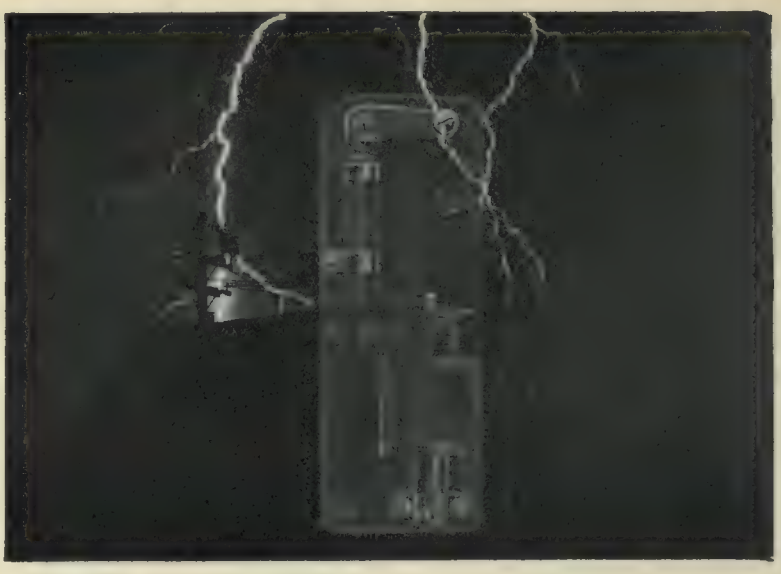
For Inspections, Tests, Analyses, Physical and Electrical Tests—wherever you desire higher efficiency or greater economy—the Arthur D. Little, Inc., service is at your command.

A Circular describing the scope of our work sent at your request

ARTHUR D. LITTLE, Inc.

Chemists and Engineers

93 Broad Street, Boston, Mass.



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Now Is the Time!

No man yet has succeeded in getting full measure of protection from lightning arresters without careful and systematic inspection. Lightning arresters, like every other piece of electrical apparatus, need inspection.

And now is the time to inspect! Do this before the first storm hits you; get your lightning arresters in first-class shape; test their ground connection; bring your protective installation to its highest efficiency; **and be safe from lightning.**

The ease and certainty of testing

Garton-Daniels Lightning Arresters

has always appealed to the operating man; for railway arresters, just stick the point of a pencil or screw driver momentarily in the air gap and "watch the plunger." Watch it "pop" if both arrester and ground are in good condition; note its sluggish action if your ground is not up to standard.

A sure test; a positive test; a reliable test.

Can you do this with any arrester other than the Garton-Daniels? Can you **see** any other arrester operate? With any other arrester can you **see** whether both arrester and ground are in good condition by so simple a test?

No book that we know of contains more valuable information about inspecting and testing lightning arresters than our 1915 catalog, a copy of which will be sent you upon your request. And when you write for copy, tell us your requirements for 1915; we'll be glad to quote you and furnish full information without obligating you in any way.

Tackle this matter while you yet have time; be prepared for the lightning season—**and be safe.**

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.



"Phono-Electric" Trolley Wire

for Catenary, Cross-span or Bracket Construction

"PHONO-ELECTRIC" is a trolley wire you can absolutely depend upon. IT'S TOUGH—does not rely on a hardened skin for its strength—it is uniform throughout its cross-section.

Unvarying reliability is what you're looking for in a trolley wire. **More car mileage and longer service life.**

The demand for better cars, better roadbeds and faster schedules is an indirect demand for better overhead wires.

"PHONO-ELECTRIC" saves renewals, and renewals cost money. It will give the longest service life. **IT'S TOUGH.**

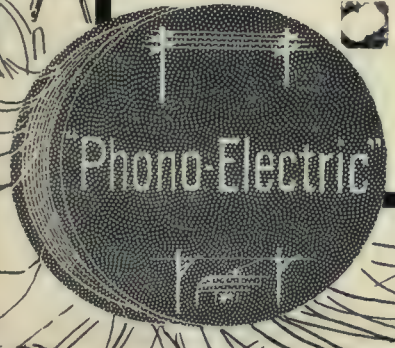
Send for our new Red Booklet.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front St., New York, U. S. A.

Pierson. Roeding & Company
San Francisco, Portland, Seattle, Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England

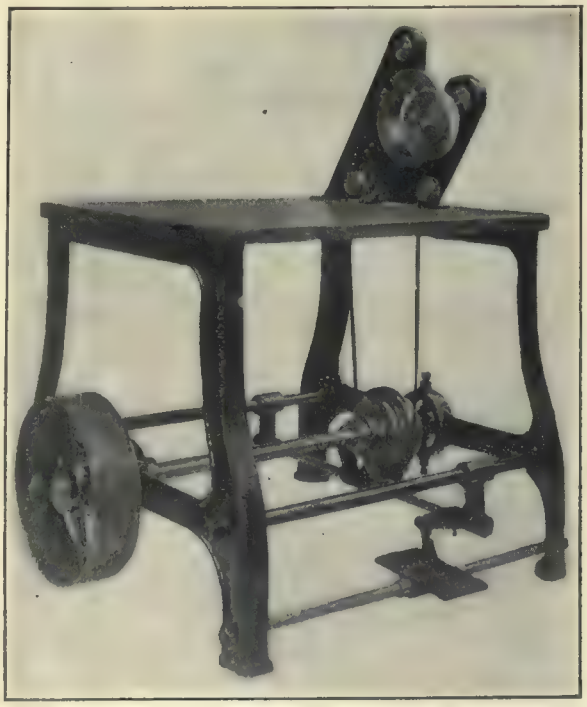


For Speedy Coil Production

—for the reduction of shop costs to minimum —make sure that your *machines* are as efficient as your *men*.

Columbia Coil Winding Machines

by their superior efficiency are in many cases making up for the deficiencies of the men operating them. But consider how much better your *good* men could do if furnished with these latest perfected winding machines. Columbia machines not only insure swifter winding but *better* winding too. We'll send you a Bulletin that tells *why*.





Columbia Field Coil Winding Machine

It is just as Important to Tape Your Coils Tightly as it is to do it Swiftly

Your coils must be taped *tightly*, if they are to be taped *rightly*. Besides, it uses less tape. You will learn how *tight* taping and *swift* taping may be best combined if you investigate the

Columbia Coil Taping Machine

Do yourself the justice of looking into the merits of this machine. And while you are looking over Columbia Coil Winding and Columbia Coil Taping machines, it would pay you to take a glance at some of the many other Columbia Products.

Our other Columbia Specialties mean other Economies
Better get some of these Bulletins:

Axle Straighteners.
Bearings for Armatures and Axles.
Armature Stands, Armature Buggies.
Car Hoists, Car Replacers.
Brake Appliances, Handles, Forgings for Rigging, etc.
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Banding and Heading Machines.
Coil Winding Machines for Field and Armature Coils.
Coils for Armatures and Fields.
Coil Taping Machines for Armature Leads.
Rolls for Flattening Leads of Armature Coils.
Car Trimmings, Car Signs—Day and Night.
Commutators, Controller—Handles, Door Locks.
Gear Cases—All Steel and M. I., Pit Jacks.
Grid Resistances, Signal or Target Switches.
Pinion Pullers, Trolley Poles—Steel.
Trolley Wheels, Tension Stands.
Track Special Work, N. W. Cartridge Fuses.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

71014 4



4

Short-term franchises are detrimental to civil welfare and growth because they ultimately check the extension of facilities and discourage good service.

—From Code of Principles Adopted by A. E. R. A.

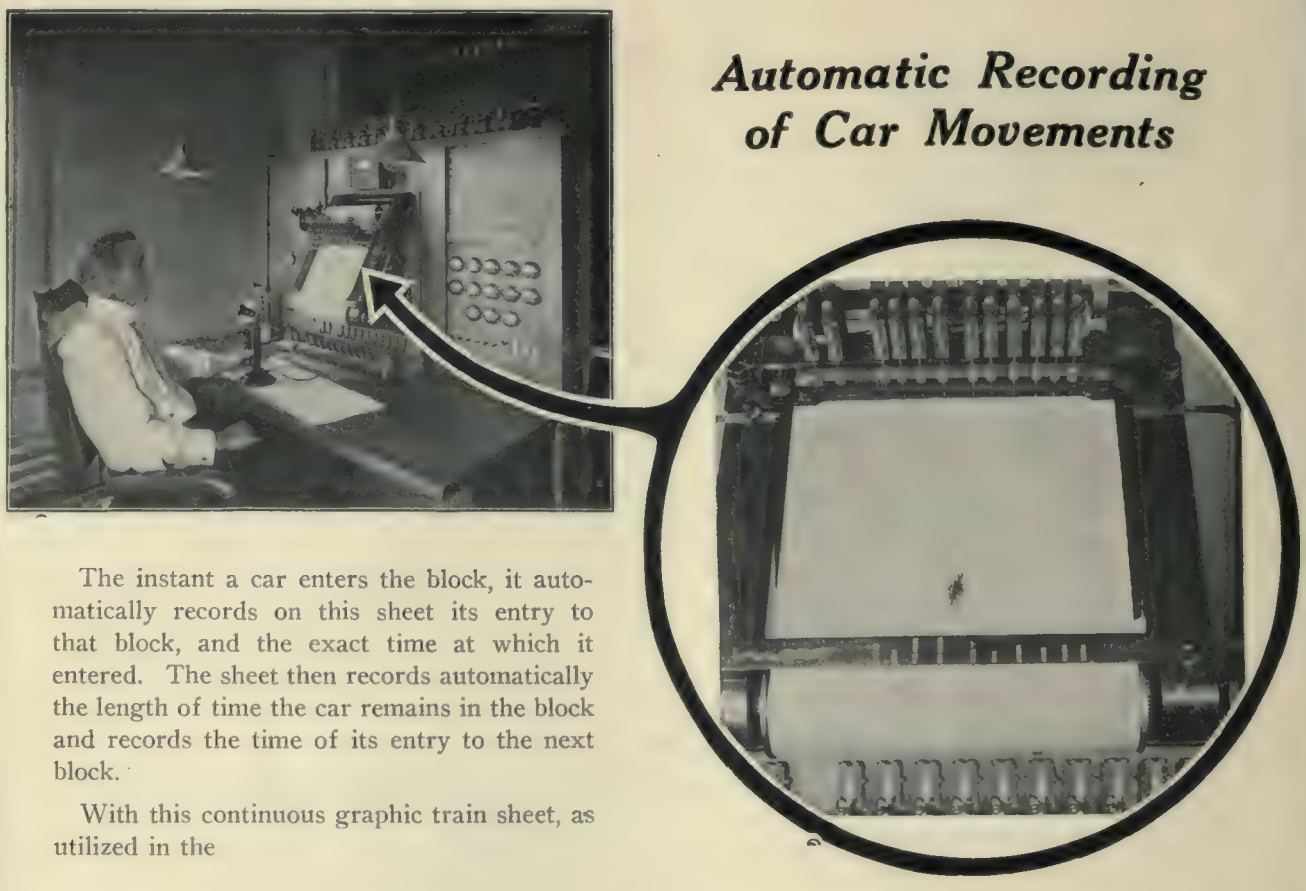
Extension of facilities and maintenance of good service can only follow profitable operation. Every one of the hundreds of roads which have adopted the

Prepayment Car

has found that move to be one which contributed to operating profits. The elimination of accidents, the augmented passenger comfort, and the increased receipts due to the elimination of missed fares have made the charge for the work and investment required to produce the designs and devices represented by the Prepayment patents, one of the most productive investments that any road can make.

The work which we have done in the past is making the work which we are constantly doing for our clients produce results such as only long, specialized experience like ours can insure.

PREPAYMENT CAR SALES COMPANY



Automatic Recording of Car Movements

The instant a car enters the block, it automatically records on this sheet its entry to that block, and the exact time at which it entered. The sheet then records automatically the length of time the car remains in the block and records the time of its entry to the next block.

With this continuous graphic train sheet, as utilized in the

Simmen System of Railway Signaling

the dispatcher has before him, every instant, the location of every car on the division, and that location is visualized to him. He has literally a moving picture of the movements of every car on the road all the time, a permanent record of the time of entry to every block, and a permanent record of the length of time each block is occupied.

By means of interlocked control levers on his table, the dispatcher controls continuous cab signals in every car on the division. These signals positively indicate the dispatcher's orders to each motorman, and are so placed in the cab that the motorman MUST see them. By consulting his record sheet, the dispatcher can see the location of every car, and if he desires to change the signals given to any of them, he can do so by simply turning one of his control levers. This combination provides SAFE OPERATION and greatly increases FACILITY OF OPERATION.

The value of this permanent record sheet does not by any means end with its value to the dispatcher in moving cars safely and expeditiously. It forms a permanent document of the highest value for improving schedules, and for fixing individual responsibility under all circumstances.

The indication of the records cannot be questioned, as they are automatically made by the movement of the cars themselves.

Automatic recording of car movements is only one of the interesting features of the Simmen System. This system presents a flexibility which enables it to meet varying conditions of traffic from those encountered on the light traffic interurban road to those found in the heavy traffic subways.

May we tell you how we can meet ***your*** *conditions?*

THE SIMMEN SYSTEM

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.
TORONTO

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
BUFFALO



Better Business

is here

—right NOW

1

This statement is borne out by the books of this company.

2

So far this year we have made and sold more United States Signals than during the last 6 months of 1914.

3

During the first ten days of this month more U. S. Signals were contracted for than during ANY full month of 1914.

4

Indications point to a record month in the history of the

United States Electric Signal Co., West Newton, Mass.

Foreign Representatives:

Quilliam Brothers, Clegg Court, Chapel Street, Salford, England

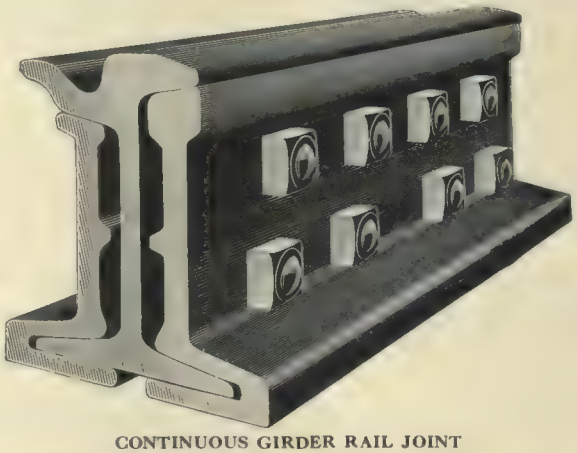


The Rail Joint Company

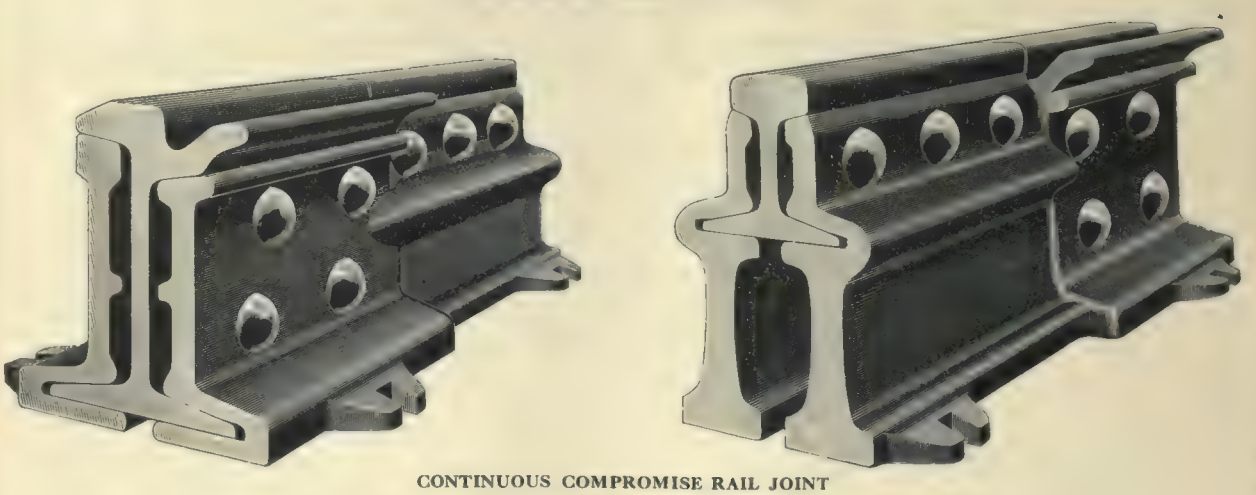
185 Madison Avenue

New York

Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard Girder, and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints. Patented in United States and Canada.

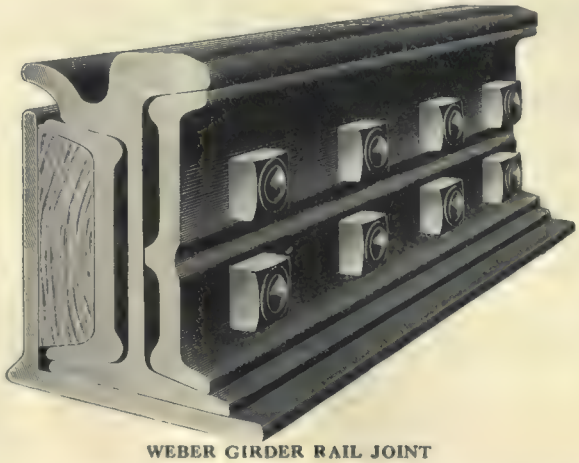


CONTINUOUS GIRDER RAIL JOINT



CONTINUOUS COMPROMISE RAIL JOINT

ROLLED FROM BEST QUALITY STEEL



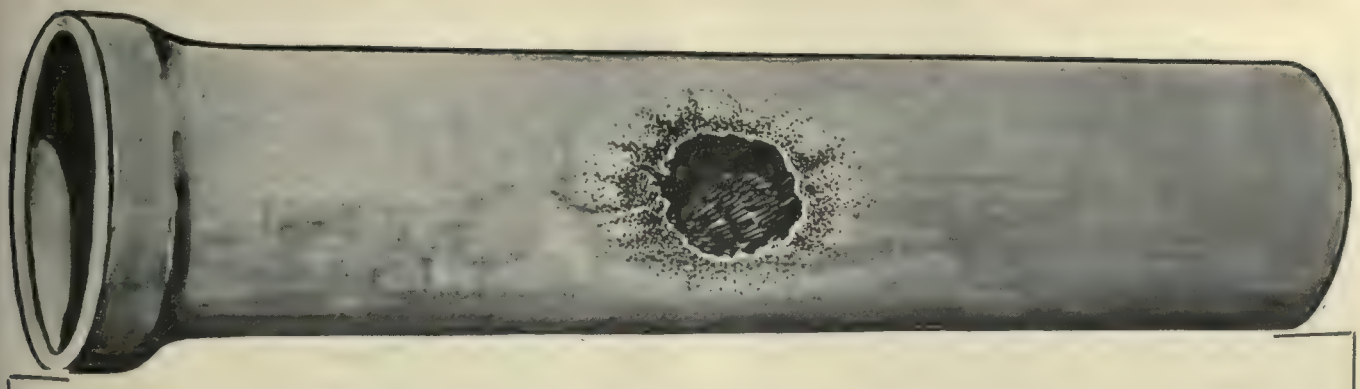
WEBER GIRDER RAIL JOINT

AGENCIES

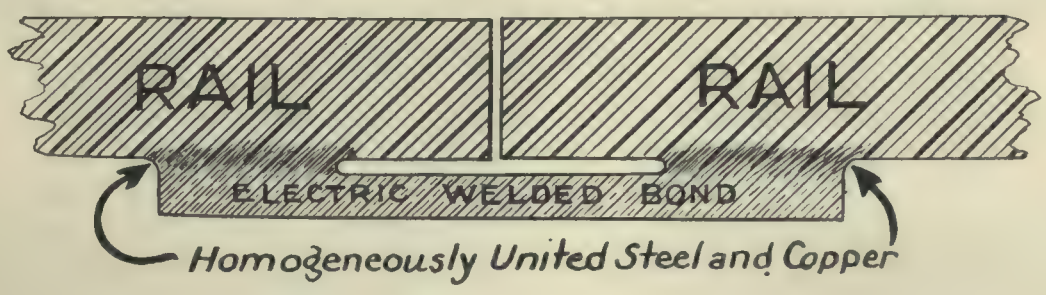
Boston, Mass. India Bldg.
Chicago, Ill. Ry. Exchange Bldg.
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Portland, Ore. Wilcox Bldg.
St. Louis, Mo., Commonwealth Trust Bldg.
Troy, N. Y. Burden Avenue

Montreal, Canada. Board of Trade Bldg.

London, E. C., England. 36 New Broad St.



The Trouble and the Remedy



WELDED RAIL BONDS

While it is problematical whether stray currents can be justly charged with as large a share of electrolytic damage to water pipes as has been held against them by water supply companies, the railway company with imperfectly bonded rails lays itself open to such charges. Much expense and trouble frequently arise from such causes.

WELDED RAIL BONDS applied to your rail joints would rid your road forever of such troubles by eliminating stray currents. The current cannot stray from rails that are bonded with Erico Welded Bonds. Moreover, energy now leaking from your system is saved to you. Write for **better bonding booklet.**

The Electric Railway Improvement Co.

Cleveland, Ohio

7187

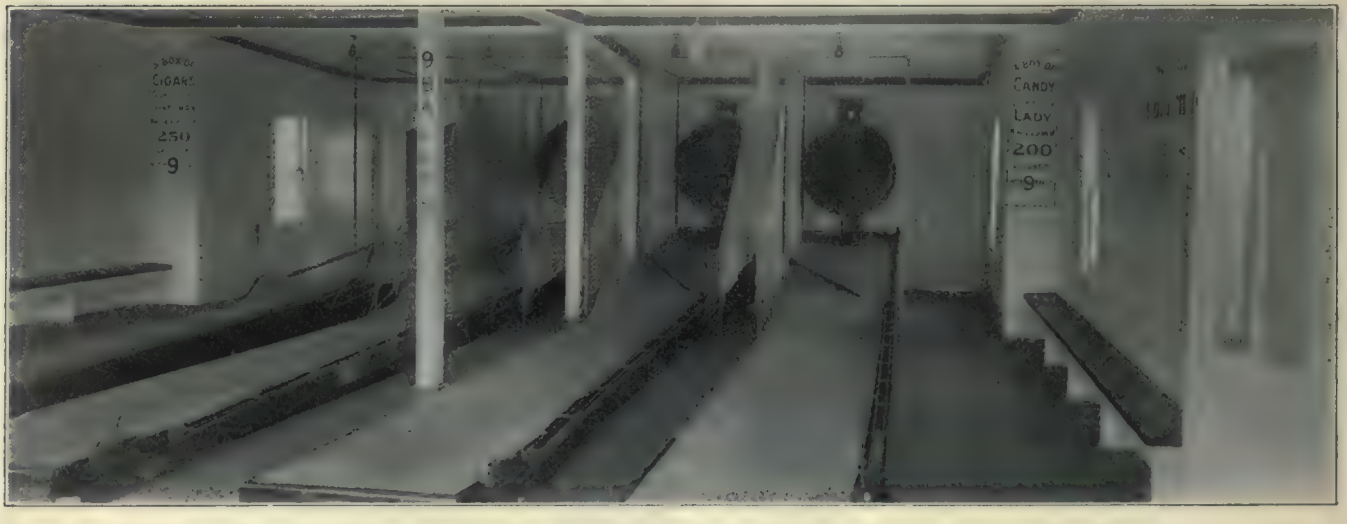
NO TROLLEY PARK COMPLETE WITHOUT

SKEE-BALL

THE NEWEST, CLEVEREST AND MOST PROFITABLE ATTRACTION



In this modest looking establishment these four Skee-Ball Alleys earned an average of Fifty-two Dollars and Fifteen Cents ($52.15) every day last summer. Write for Booklet.



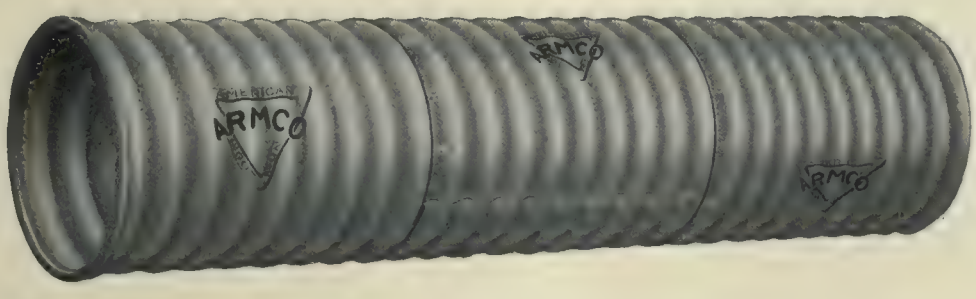
The Automatic Scoring Device attracts the crowd; the Automatic Slot Machine collects the money, and the skill and fascination of the game holds the players.

Place orders NOW for early deliveries

THE J. D. ESTE COMPANY

1534 Sansom Street, PHILADELPHIA

Purity



Permanence

How Fast Does Your Scrap Heap Grow?



These were *saved* from the scrap, reclaimed and put to work again by welding with the Davis-Bournonville Oxy-Acetylene process. In the pile were motor frames for street railway motors, seven automobile cylinders, an automobile crank case, rear axle housing cover, license plate holder, motor cycle crank case, headlight bracket, power shear frame, machine bracket, two hydro-carbon converters, exhaust manifold and intake manifold.

Where a Davis-Bournonville welding outfit or plant is installed there is little danger of throwing good money on the scrap heap. An outfit is of even greater value on emergency repair work, saving time for repairs when time is a big factor, or for steel cutting when quick changes in construction or wrecking is required.

The difference between a welding outfit and a complete Oxy-Acetylene plant is determined by the extent to which the process can be used. We provide the most complete range of equipment, adapted to all requirements, including portable outfits and the most complete plants. The "cost" of welding equipment is determined by the results obtained with it. Davis-Bournonville apparatus has both experience and service back of it and has been producing profitable results for the most prominent concerns engaged in metal working for many years past.

DAVIS-BOURNONVILLE COMPANY

NEW YORK — General Offices and Demonstrating Plant JERSEY CITY, N. J. — CHICAGO

Sales Offices: New York, Chicago, Cleveland, Detroit Philadelphia Pittsburgh.

DAVIS-BOURNONVILLE CO. DAVIS APPARATUS NEW YORK-CHICAGO

General Dealers with demonstrating plants in New England and Western States.

LAST CALL

This **Special Offer** expires absolutely on publication date, March 10th.

If you will sign and mail the coupon immediately we will extend the time to cover delay in mail transmission.

SPECIAL OFFER

We will send this book on the day of publication to all advance subscribers in the United States at the special price of $3.50 postpaid. The price on publication will be $4.00 net, postpaid.

In addition—you have your choice of the following offers at the special price:

(a) Your name stamped in gold on the cover, free of charge. Stamped books are not returnable.

(b) On approval for ten days, with the privilege of return if unsatisfactory. No money in advance.

THE BOOK

A book of high authority and absolute reliability. It gives the essential reference data on all phases of electric railway construction and operation. It is designed for rapid use. Every article is indexed so that you can find it instantly. The book represents the combination of these ideals:

(1) To present data on subjects which come up in everyday electric railway practice, for constant use by the operating, constructing or designing engineer.

(2) To produce a book of service to the non-technical manager or operator as well as to the engineer.

(3) To produce a reference book on electric railway practice for those who may be specializing in other or allied lines.

McGraw-Hill Book Co., Inc.

239 West 39th Street, New York

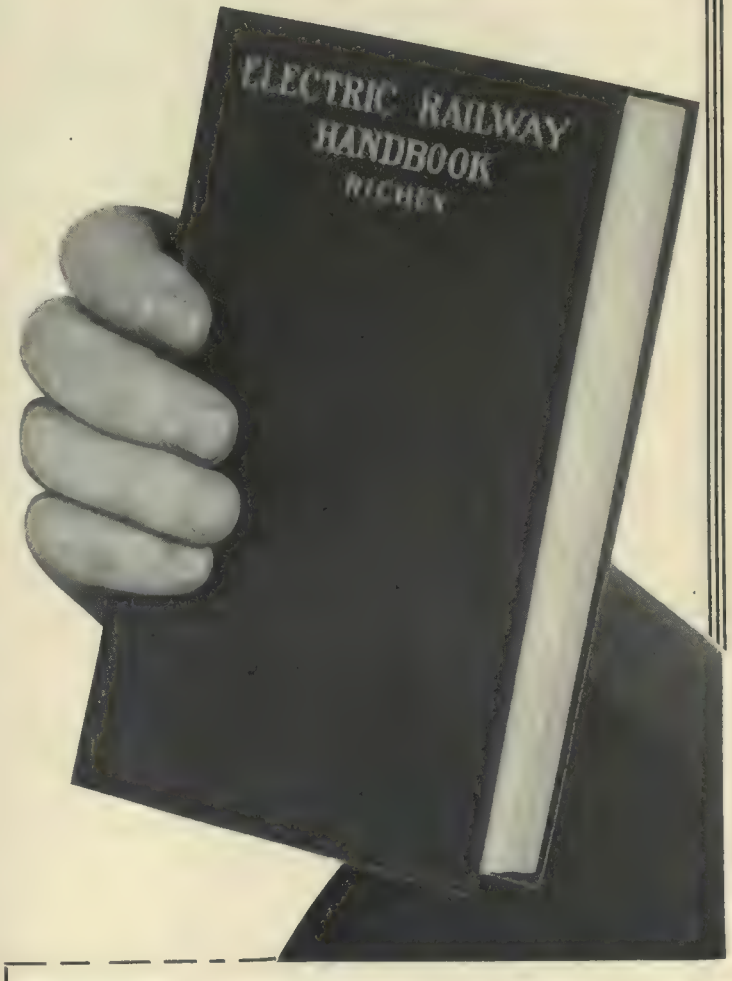
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Publishers of Books for Electric Railway Journal

Your Last Chance at the SPECIAL OFFER to Advance Subscribers

Return the coupon TODAY

Ready March 10th



McGRAW-HILL BOOK COMPANY, INC., 239 West 39th St., N. Y. City.

You may enter my order for Richey's "ELECTRIC RAILWAY HANDBOOK" on the offer checked.

....A. At $3.50 with my name stamped in gold on the cover. Print name clearly. Not returnable.

....B. On approval, to remit $3.50 or return book within ten days of receipt.

Signed

Address

..... E 3-6

If not a subscriber to the Electric Railway Journal, give reference in margin.

THE OHMER SYSTEM

The OHMER SYSTEM stands today as the only thoroughly proven and universally successful method of fare protection.

We have gone to infinite pains to satisfy ourselves that we are right. We have investigated every device offered to the industry and have studied every possible operating condition.

Our efforts coupled with the co-operation of hundreds of satisfied clients have opened greater possibilities for the effective application of the OHMER SYSTEM than we had ever before thought possible.

This year new problems are confronting the electric railways of this country. Conditions will be analyzed more carefully than ever before. Economy coupled with the necessity of wise administration will prevail among electric railway managers. It is because the OHMER SYSTEM stands for economy in its truest sense that many have stopped experimenting and are turning to us for help, while our old patrons are regularly renewing their contracts as they expire. We take considerable pride in this continued and growing confidence in the OHMER SYSTEM.

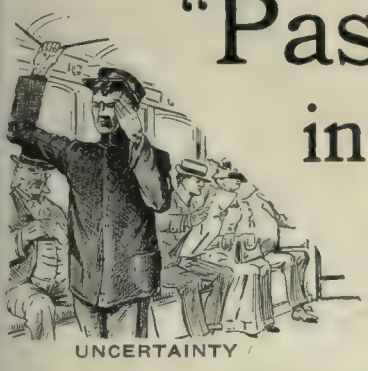


This year we are concentrating our efforts towards giving better OHMER SERVICE than ever before. We shall be very glad to study your local conditions and make you a proposition without putting you under any obligation to us.

OHMER FARE REGISTER CO.

DAYTON, OHIO

"Passenger-Interest" in Fare Collection



What is it?



Passenger-interest must be *properly timed* with reference to *other* interests involved, i. e., *conductor*-interests of all kinds, and *company*-interests.

Passenger-interest *must be automatically enforced*, otherwise you do not get it. You cannot secure this interest through any friendly mental process on the part of the passenger or optional act on the part of the conductor.

The Rooke System



alone properly secures and utilizes passenger-interest

The passenger *must* give attention to the *method of* paying his fare under the ROOKE SYSTEM. He must *look* in order to insert his coin; must necessarily *feel* the coin being mechanically drawn from his hand and registered; must *hear* the ringing of the bell which announces a completed transaction in which the **passenger, company and conductor have all been automatically brought into proper business relationships,** one with the other.

The passenger KNOWS his fare has been properly registered. In effect he has been given a receipt (something the N. C. R. people are vainly trying to hook up with their store register in order to materially add to its efficiency). Unless a fare collection system gets this whole and undivided attention of the passenger that *one instant*—and unless that one instant of time is automatically used by the company to insure registration, classification and delivery of money to the conductor—unless your fare collecting system comprehends all these things you certainly "kiss yourself goodbye" to maximum earnings and enforce on your employees unfair working conditions.

Permit us to enlarge on this absolutely vital phase of the fare collecting game.

The Fundamental Purpose

in all systems of fare collection is to secure passenger-interest.

The Fundamental Fault

in nearly all systems of collection is that they do NOT secure this passenger-interest—at least the QUALITY of interest necessary.

The Fundamental Reason

for the success of the ROOKE SYSTEM is that it alone DOES secure this Passenger-interest.

Uniform System for all Cars

Rooke Automatic Register Co.

Providence, R. I.

3495



FABRIKOID
Electric Railway
Car Curtains
and Upholstery

DU PONT FABRIKOID

REG. U. S. PAT. OFF.

FABRIKOID
Curtains on
this Car

It's Weatherproof and Durable

Wind and storm beat in vain against DU PONT FABRIKOID CURTAINS. Fabrikoid is weatherproof. Rain won't shrink it—it's **impervious to moisture.** In fact you can freely use soap and water on it, which cleans it perfectly. Dust and dirt can't cling to its smooth surface, nor catch in cracks. Because it **doesn't crack**—nor peel—nor flake. It's sanitary, durable and rich in appearance. Yet its cost is low—its **maintenance** still lower. **Economical,** made in many weights, widths, patterns and colors. Write for samples and prices.

DU PONT FABRIKOID COMPANY

Du Pont Building, Wilmington, Del.

Railroad Dept. Representatives:

WENDELL & MacDUFFIE COMPANY
63 BROADWAY, NEW YORK

7241

JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY





The men in the Trenches

That installation crew whose time eats into so much money will move along three times as fast when they work with

J-M FIBRE CONDUIT

Every time they nipple up a length—five feet of duct is finished, with an airtight joint made in a trice.

They will work quicker and easier too, because of the lightness of this conduit, nor can they break it when it gets thrown around, as it often does.

J-M Fibre Conduit answers every railway requirement, electrical or mechanical. It can be used generally all over the underground system in Generating Stations, Sub-Stations, back of Switchboards, on Feeders and on Signal Systems.

Why not use it on your system?

This is the Factory Test on all "NOARK" Subway Boxes

While immersed in water each box is subjected to an internal air pressure of 15 lbs. per sq. inch.

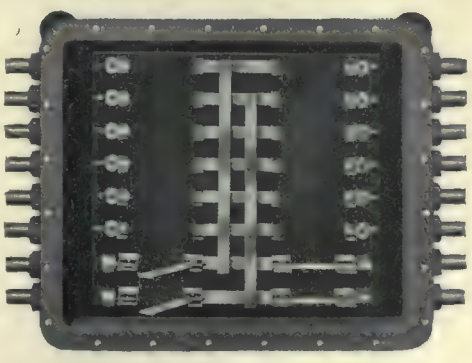
Before shipment every "Noark" Subway Box must successfully pass this test—the severest ordeal to which it can be subjected.

You will note that not only is the box water-tight from the outside, but is also air-tight from the inside.

Doesn't this argue well for its manhole efficiency; for protection of your feeders, subfeeders and other cables—against seepage and subterranean gases?

When you install "Noark" Subway Boxes you are using a box with a big factor of safety—a box that is electrically and mechanically perfect, from the nuts that hold down the cover to the slate base on which the copper is mounted.

The copper in "Noark" Subway Boxes is ample and well assembled. All contacts are carefully *ground*. The line is complete, embracing every network and distribution condition.



Write for Catalog No. 406

J-P-Co. NOARK FUSE

H. W. JOHNS-MANVILLE COMPANY

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark, N. J.	Pittsburg	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland, Ore.	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver 3054

See Our Exhibit of Ties and Crossing Foundations at Chicago, March 15th to 19th, in Coliseum Annex. Spaces 207-208.



Main Street, Elyria, Ohio

There's no replacement expense with *these* ties; they're

International Steel Ties

When you put "Internationals" into your road bed, you know they're in to stay—that you've cut **that** part of your maintenance expense to the vanishing point.

And you know they're not only durable but they give you a much larger, stronger rail support than you can get with a wood tie. And the anchorage is solid—you can lift a whole section of track without loosening a single clip.

Use them in a section of your track and you'll understand why they are rapidly being standardized by many of the large electric roads throughout the country.

You can't afford to continue building track in paved streets without first investigating what has been and is being done in this type of construction.

Our references are our users. Write us today.

International Steel Tie Co.

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Parrott & Company, San Francisco, Cal. Los Angeles, Cal.

Western Eng'g Sales Co., Seattle, Wash. Portland, Ore.

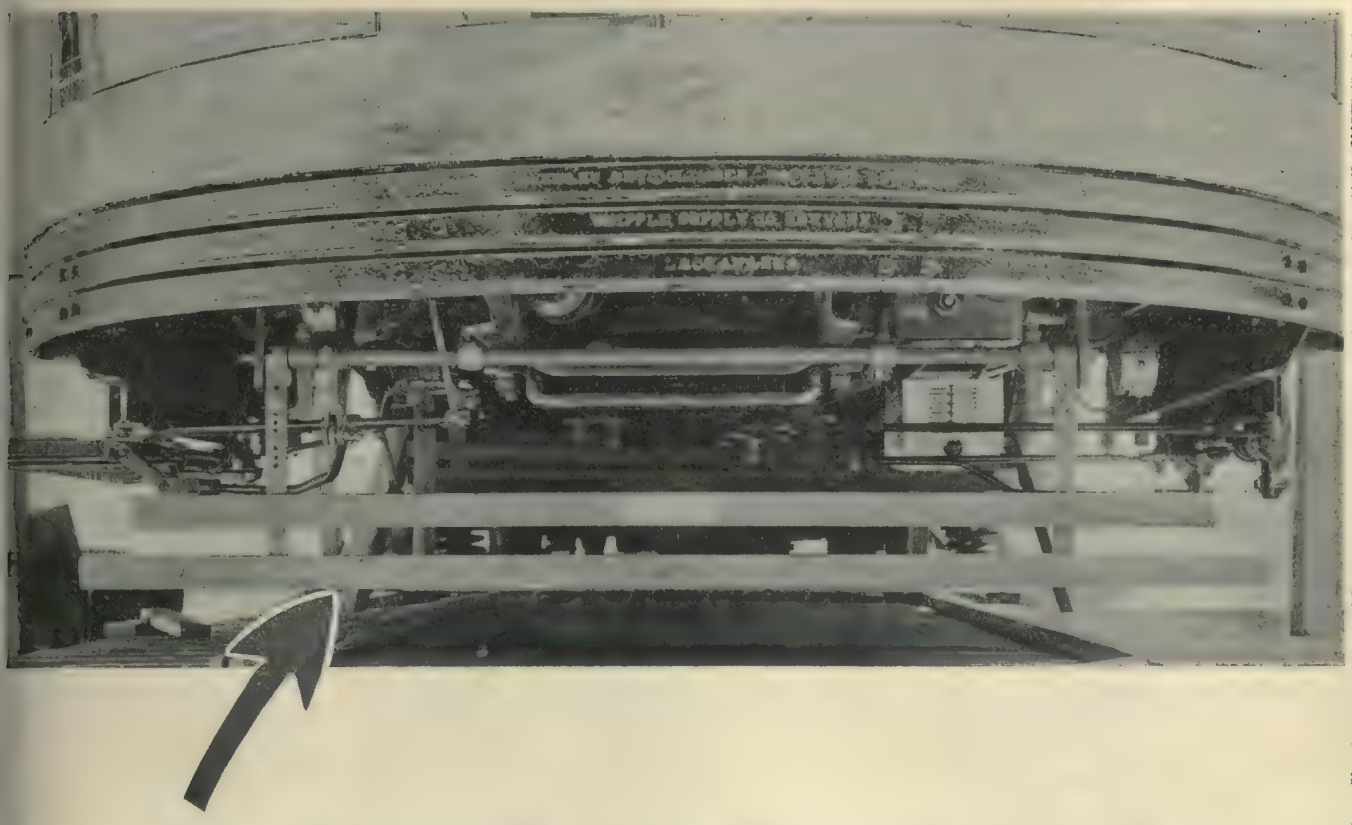
R. J. Cooper Co., Salt Lake City, Utah

William H. Ziegler, Minneapolis, Minn.

J. E. Lewis & Co., Dallas, Texas

Maurice Joy, Philadelphia

7P65-P



Order them Equipped with H-B Life Guards

Your cars must be provided with some means for life saving. You'll find that H-B Life Guards afford the economical means to this desirable end.

Service records prove it.

Above is shown a car built by the St. Louis Car Co., loaded for shipment. It is provided with the H-B.

The Consolidated Car Fender Co., Providence, R. I.

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

General Sales Agents

3110

Electric Railway Directory

for February 1915

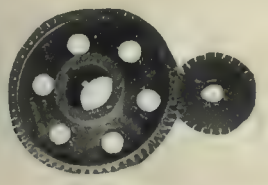
Send Your Subscription Now

$5.00 a year for issues of February and August, or $3.00 for single copies.

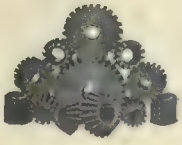
The only electric railway directory published which gives the addresses of all the electric railway officials, and is **completely** revised prior to each issue.

This directory should be in the hands of every sales manager and every salesman selling to the electric railway field.

McGRAW ELECTRICAL DIRECTORY
239 West 39th Street
New York



Here's How



"Tool Steel" Gears and Pinions

work in

NEW ORLEANS

Record of pinion installations at Magazine shops New Orleans Ry. & Lt. Company (these figures used with their permission):

1912	**Total number of pinions installed**	**604**
	They were just beginning to equip with "Tool Steel" and this was the rate at which the untreated pinions were wearing out.	
1913	**Total number of pinions installed**	**168**
1914	**Total number of pinions installed**	**96**

Reduction in Gear and Pinion Expenses for 1914
Was Over $2300.00

Do you wonder New Orleans Ry. & Lt. Co. is under contract for "Tool Steel" gears and pinions?

You can reduce **your** pinion renewals in a ratio of 604 to 96 if you use "Tool Steel." Most of those who read this advertisement **are** doing so. If **you** are **not**, it's **your** loss.

THE TOOL STEEL GEAR AND PINION CO.

CINCINNATI, OHIO

U. S. Metal & Mfg. Co. { New York, Chicago, Atlanta

W. F. McKenney, Portland, Ore.
F. E. Huntress, Boston, Mass.
Allen General Supplies, Toronto, Ont.

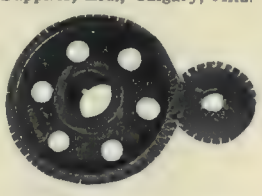
S. I. Wailes, Los Angeles, Cal.
F. F. Bodler, San Francisco.
General Supplies, Ltd., Calgary, Alta.



Scholey & Co., Ltd., London — Exports Into British Territory

THE ACKLEY COMPANIES — OTHER EXPORTS

Ackley Brake & Supply Co., Inc'd, New York.
British Ackley Brake & Supply Co., Ltd., London.
For Belgium, Holland, Denmark, Norway and Sweden
Cie, Francais Des Freins Ackley, Paris.
Deutsche Ackley Bremsen Co., Berlin.



Now is the Time!



Send us your catalog

We are ready to plan an unusual but effective sales move in the form of a special advertisement that will help you get your products specified for this Spring's

Maintenance Work Indoors and Out





The Annual Maintenance Number of the Electric Railway Journal

March 20th

is the buyers' handbook of the day while maintenance work is under contemplation and under way. Electric railway men who control the buying for 98.8% of the total mileage read the Journal regularly and read the Maintenance Number with special thoroughness every year for its helpful text pages and useful advertisements.

It is the issue which tells them how best to do their maintenance work and what to buy.

Use a double page spread or at least a full page advertisement and get your share of the $55,000,000, which will be spent for maintenance by readers of the Electric Railway Journal.

Bear in mind that the Journal's Annual Maintenance Number is an institution that is wanted and welcomed and used every year. It is expected. Your advertisement will have careful attention by big buyers if you tell the right kind of story in this issue.

We Are Ready to Write the Story for You Without Cost.

Send Your Catalog and

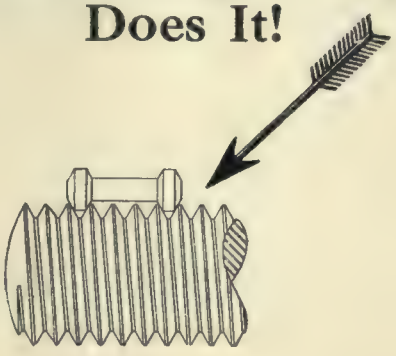
Get your products into the specifications



This is the Last Call



This Rolling Wedge Does It!



That's the Reason for the Absolute Locking, Safety, Security and Economy of the

"ABSOLUTE" Lock-Nut

Observe the recess which has been cut across the nut at right angles to the threads. The floor of this recess slopes. Notice also the rolling wedge. When the nut is being applied the pin rests in a deeper part of the recess and rolls with the bolt.

The moment the nut starts to back, it immediately encounters the resistance caused by the rolling pin wedging itself into the higher level of the sloping floor of the recess. The result—all motion is stopped. The nut is locked absolutely. The greater the pressure tending to back the nut, the tighter it locks.

Vibration tightens the *Absolute*. Rust and dirt do not destroy its action.

Easily removed by inserting a common nail alongside the rolling wedge, preventing it from wedging.

It's as strong as any bolt. Write for results of tests.

The *Absolute Lock Nut* is nut and lock-nut, all in one. Saves in bolt length and time of application, as well as insures safety and certainty.

Costs no more than nut-locks. Write for catalog describing it.

The American Lock-Nut Co.

Pullman Station, Chicago



In up-to-date shop practice, the above arrangement for removing axle sets and motor armatures for repairs, is much in evidence; the use of the Barrett jack for this purpose is a detail insuring lasting satisfaction.

BARRETT

Motor Armature Lifts

consist of a Barrett Pit Jack, mounted on a truck having plain or flanged wheels. The jack can be adjusted in four directions—up or down by means of ratcheting, sideways on truck by means of small crank at side of truck, and forward or backward the length of the pit on the truck wheels. Accurate adjustment of jack for receiving axle or armature is thus obtained. The long operating handle affords easy leverage for one-man operation.

The whole installation is economical in first cost, insures safe handling of costly equipment, speed and convenience.

Stock Sizes

The genuine Barrett jacks are only made by the Duff Company, and include the largest variety of *stock sizes for track and car repair work, as well as for equipment of cars for use in cases of emergency and accidents.*

Designing New Jacks

We offer our services in designing jacks to handle special equipment and for special lifting purposes, having at our disposal the best engineering talent backed by 25 years' experience exclusively in the design and manufacture of jacks.

The Duff Manufacturing Co.

Established 1883 **Pittsburgh, Pa.**

50 Church St., New York — People's Gas Bldg., Chicago, Ill. — Candler Bldg., Atlanta. — Merchants' Natl. Bk. Bldg., St. Paul.



Knocking Dollars Out of Your Profits

every time you have a collision, and most collisions can be prevented. Aren't you taking too much of a chance on that piece of single track that has no signal? Aren't you crowding it just a little too much during the summer rush?

Chapman Automatic Signals installed this spring will give you safe, better and more satisfactory operation, and will cost much less than one ordinary collision.



Write to-day for a statement of what we have done for others.

7136

Charles N. Wood Co.

General Sales Agents **79 Milk St., Boston, Mass.**

The Claim Agent's Best Friend



Oscillating blades which keep swinging until the train has passed; a night illuminated warning; a loud-voiced locomotive bell, with a peremptory note that can be heard above the noise of automobile traffic; a mechanism that needs no bond wires, track circuits or delicate apparatus—these are the strong features that have made the HOESCHEN HIGHWAY CROSSING SIGNAL the backbone of the "Safety First" movement.

HOESCHEN Highway Crossing Signal

Does not interfere with track circuits and is not operated by trolley current. Free from electrical troubles.

The bell is started, stopped and wound by the movement of the car wheels over the track. The bell is connected by a metallic circuit with magneto generator which is operated by means of an arm clamped rigidly to the base of the rail. A slight lateral movement of the rail head, caused by the pressure of the wheels of train passing over it, is multiplied many times at the outer or free end of the arm. This operates the generator. Installed on more than 100 steam and electric railroads in America and abroad.

Write for Descriptive Matter and Photographs

Hoeschen Mfg. Company

Omaha, Neb.

Needed by EVERY Electric Railway in the Country!

An OXWELDING Outfit



The tremendous amount of work your men can do in track construction and shop practice through the use of the OXWELD Process of Welding and Cutting Metals will prove a revelation to you when you investigate the subject.

Expensive car equipment may be repaired at comparatively trifling cost and not only avoid expensive delays waiting for new parts; but save tremendously by eliminating the need for new equipment.

Steel parts may be cut by the OXWELD ACETYLENE Blow Torch in a fraction of the time required by any other method.

Some Savings on the Indianapolis Traction and Terminal

BRILL NO. 27-F SIDE FRAME—Nature of repairs, refilling worn pedestal faces. Cost of repairs, $8. Cost of replacement, $38. Scrap value, $1.50.

STANDARD NO. 0-50 END FRAME—Nature of repairs, refilling end connecting holes. Cost of repairs, $4.50; Cost of replacement, $7. Scrap value, $0.60.

WESTINGHOUSE NO. 93-A2 MOTOR FRAME (TOP HALF)—Nature of repairs, welding gear case suspension lug. Cost of repairs, $8.91. Cost of replacement, $105.17. Scrap value, $2.76.

WESTINGHOUSE NO. 56 MOTOR FRAME (TOP HALF)—Nature of repairs, welding axle bearing housing. Cost of repairs, $12. Cost of replacement, $77.76. Scrap value, $2.66.

Isn't apparatus which will effect such savings worth investigating? Write for further particulars

Oxweld Acetylene Co.

Newark, N. J. ***Chicago***

What you get out of *your* Electric Railway Journal

depends upon the time and thought you put into the reading of it.

Thought, time, energy and money are expended in abundance to make each issue of maximum value to the greatest possible number of readers. You benefit by this expenditure in direct proportion to the attention which you give to your paper.

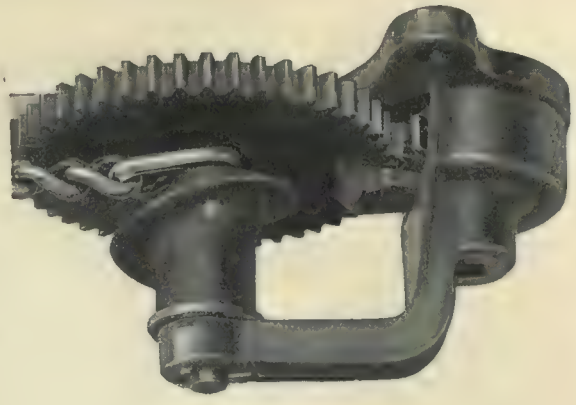
A mind alert for suggestions will find in every issue food for thought and help in its daily tasks. This applies to the reading of the advertising pages, as well as to the reading of the text.

Remember that electric railway progress is due as much to the efforts of the engineers engaged in developing new equipment for manufacturers as to those who buy and use what these manufacturers tell about in their advertisements.

These engineers who give their talents to the manufacturing branch of the industry are always ready to give the benefit of their study and experience to their fellows in the field. An inquiry addressed to the advertiser is usually all that is required. It will receive prompt attention whether or not you are in the class of potential buyer at the time.

Advertisers know the advantage of giving full and reliable information to everybody in the field who indicates his interest in anything relating to the advertised product.

Make the Most of It



Peacock Improved Brakes

may look like other brakes but their reputation is due to the difference.

OVER 93% of the geared brakes installed on new cars last year were PEACOCKS.

Each brake is equipped with roller bearings, automatic stops, simple and positive. Every chain is tested and there are many other exclusive features.

There is no other means of securing so much power with so little weight, within so small a space as with the Peacock Improved Brake.

If you would like a record of results write us at once, but don't forget to put them in your specifications.

National Brake Co.

888 Ellicott Square, Buffalo, N. Y.

Boosting Brake-Shoe Mileage

S. W. B.

Automatic Shim Slack Adjuster

Has no moving parts. Positive in action—just like putting another block under a crow-bar — only the thin S. W. B. Shims take up the slack a little at a time, just as fast as the shoes wear, and no faster.

You need it to cut costs—your motormen need it for safety's sake.

Write for the full data.



THE SAUVAGE-WARD BRAKE CO., INC.

Whitehall Building, New York

Agents for Virginia, North and South Carolina, and Georgia: J. B. N. Cardoza & Co., Citizens Bank Bldg., Norfolk, Va.

9297

You Will be Interested in it too

The New Sterling Catchers and Retrievers contain novel features that will interest you:
Retrieving Spring adjusted to meet any trolley pole tension.
Action of this spring does not affect service spring.
Absolutely prevents skipping of pole after it leaves wire.
Little mechanism, few parts easily cared for.
Guaranteed for 5 years.
Write for full details.



STERLING Retrievers and Catchers

The New Haven Trolley Supply Company

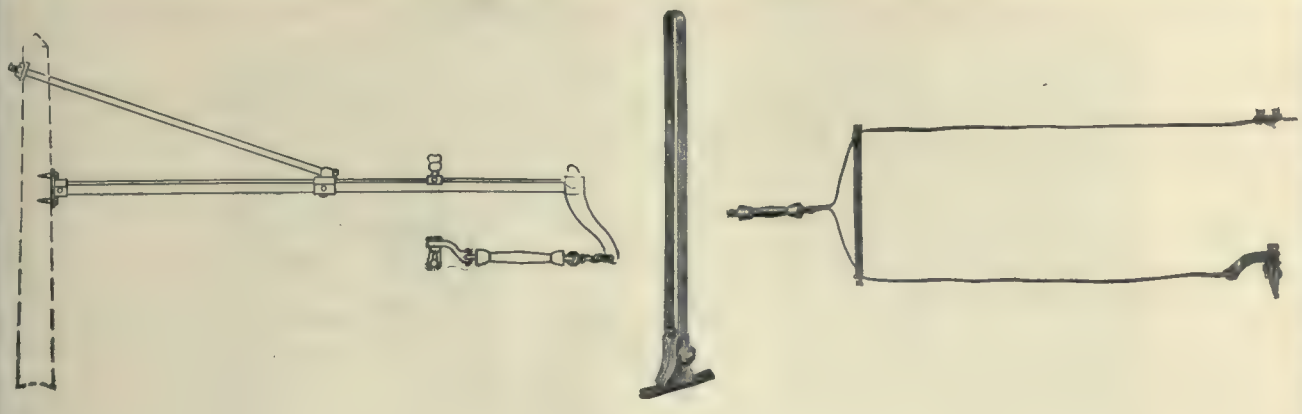
New Haven, Conn.

STERLING Trolley Wheels

STERLING Fare Registers

RECORDING Fare Registers

3104



G-E Catenary Line Material

Wherever extreme flexibility is required of the overhead installation, G-E Catenary Line Material should be used. "Hard spots" in the wire are entirely eliminated by the use of flexible hangers and pull-offs, as shown in the above illustrations. All material is rendered rust proof by the G-E electric oven sherardizing process.

The many new and improved designs originated by G-E engineers make the catenary type of line material especially suited to high speed operation and readily adaptable to the varied problems of electric railway construction.

G-E Catenary Line Material is in use on the 154-mile interurban line of the Southern Traction Co. and the Butte-Anaconda lines and will be used in the big St. Paul electrification.

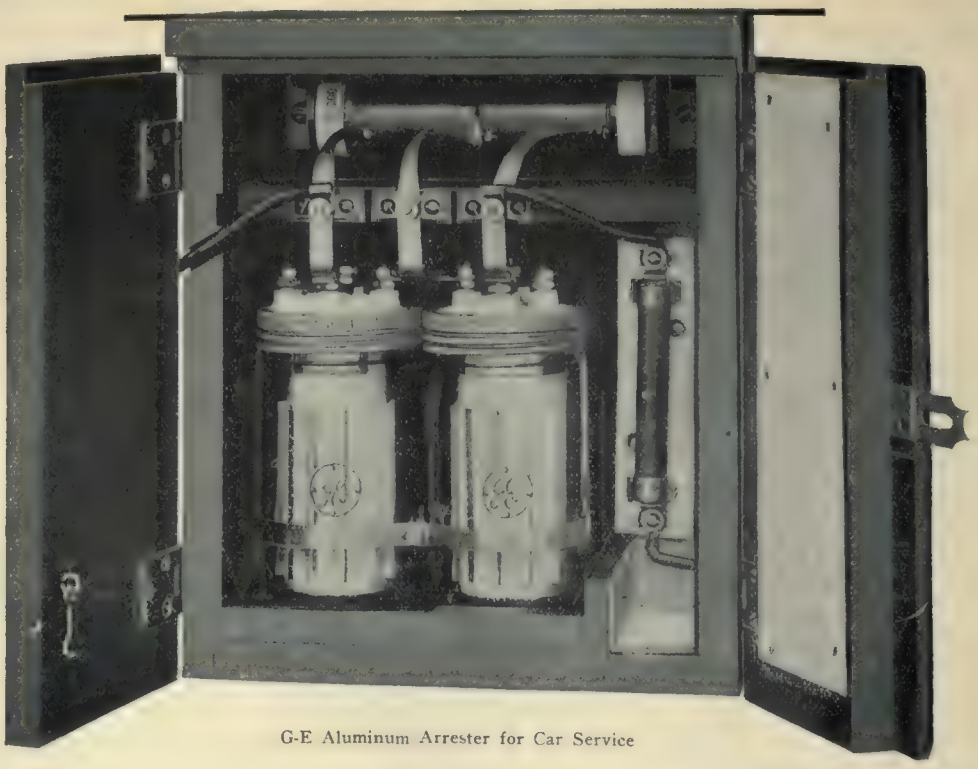
Recommendations and estimates will be furnished on request.

General Electric Company

General Office **Schenectady, N. Y.**

List of Sales Offices on Back Cover.

5304



G-E Aluminum Arrester for Car Service

Proof of Protection by Aluminum Car Arresters

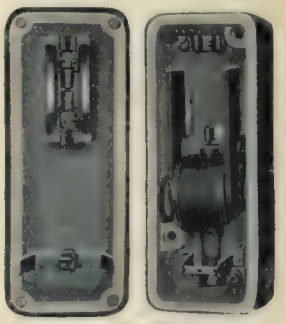
Last year a certain railway company equipped 50 of its cars with G-E Aluminum Lightning Arresters.

No car equipment protected by these arresters was damaged. At one time when a substation was struck by lightning the car equipments were uninjured, although a large number of cars protected by these arresters were operating in that locality.

During another storm, fifteen protected cars and four unprotected cars were operating on one line. Two unprotected equipments were badly damaged; the protected equipments, as usual, escaped without harm.

G-E Aluminum Arresters have made uninterrupted service possible, in the worst lightning areas in the country, where it had been customary to stop the cars during lightning storms. Even in these localities, the arresters have kept damage down to a point where it is almost negligible.

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AS TO HOLDING BRIEFS

Some good friends of the JOURNAL have taken exception to the editorial—"A Brief for the Railways"—which appeared in a recent issue. The exception is taken on the ground that we should not hold a brief for any interest. This is on the theory that a brief in this sense means a one-sided presentation; that it means special pleading and in general a declaration of "My country (or its electric railways), right or wrong!" This, however, was not our idea. The JOURNAL is the voice of the electric railway industry. When this industry is unfairly attacked the JOURNAL seeks to defend; but when policies or individuals go wrong it is the JOURNAL'S business to point out the error. The principal aim to be accomplished is a better understanding of the problems of the electric railways both by themselves and others. In these problems we include questions in respect to their construction, equipment and operation and also those of public policy. Anything that will aid in bringing about this understanding—whether it is defense, criticism or merely exposition—is a part of the brief that we hold for the electric railway industry. Owing to the fact that misunderstanding is rife and attack not infrequent, it may occur that the JOURNAL will often be placed in the attitude of defense, but always, it is to be hoped, defense of the right.

RATIONAL UNITS IN THE BOILER ROOM

The communication from H. G. Stott, published elsewhere in this issue, constitutes the strongest argument of which we can conceive for the abolition of the unit, "boiler horse-power." In this Mr. Stott points out that there are two uses for the term, one being to rate boilers in making purchases, and the other being to measure outputs of steam-generating apparatus. In both cases there are introduced material disadvantages, of which the imposition of unnecessary labor in engineering calculations (owing to the odd value of the unit) is certainly worth consideration by all engineers. The term has been perpetuated in part by its appearance in boiler-maker's catalogs, although its effect is modified by the practice of the best manufacturers in specifying the area of heating surface that applies to each rating. But in the main it is the use of the "boiler horse-power" in the standard boiler-testing code of the American Society of Mechanical Engineers that offers the real obstacle to the adoption of a rational unit. In the "short" code the term "boiler horse-power" appears twice, once as the "manufacturers' rating" and once to express the actual output of the boiler under test, and as the society has now completed the monumental work of standardizing a code for boiler construction, the time seems most opportune for a revision of the testing code as well. Even if opposition to the myriawatt (or some other rational unit) should prevent its use in such a revision, the testing code at least will be better off with the two references to boiler horse-power eliminated altogether.

NEW YORK ASSOCIATION MEETING

That the quarterly meeting of the New York Electric Railway Association held this week at Lake George was unusually successful was due in large part to the plan used in producing the program. That it was a profitable meeting was attested by all present, one long-time convention goer stating that he had never voluntarily sat so continuously at a meeting of the association before. The device employed by President J. F. Hamilton was as follows: Three topics of vital interest were selected for discussion and two of these were assigned to two members with the request that they prepare brief papers suitable for opening the discussion. Copies of these were distributed to all members with the request that three-minute contributions be prepared in advance and delivered at the meeting. The result was that the available time was not sufficient for the presentation of all of these and for the expression of ideas spontaneously developed during the discussion. The advantages of this plan are that it insures a considerable reading of the papers in advance, these being brief and calculated to bring out differences of opinion; it encourages members unaccustomed to speaking to venture on a small scale; it permits the prompt launching of discussion at the meeting, and it minimizes the amount of rambling discussion which always accompanies lack of preparation. The plan is especially well adapted to the smaller associations at whose meetings a large proportion can have the floor if they do not want to keep it too long.

ENCOURAGING SIGNS FOR THE RAILWAYS

It is encouraging to have such utterances from high officials as those presented at the Indianapolis meeting last week of the Central Electric Railway Association by Governor Ralston of Indiana and Chairman Duncan of the Public Service Commission. Both are evidences of a saner view of the functions of the railways, which is becoming, we believe, more general. Both of these gentlemen, in representing the public, spoke about the responsibility of the railways to give good service, and if this was done the willingness of the public to grant rates that would furnish a reasonable return on a fair capitalization. Requests from

the railways for an increase in fares must be justified by a presentation of the facts, but Mr. Duncan, in his interesting analysis of the financial reports of the Indiana roads, showed that on the copper-zone basis the returns should be about 6 per cent on a capitalization per mile of track, which does not differ greatly from the actual capitalization of a considerable number of the interurban companies. Finally, Governor Ralston stated in unequivocal terms that it was his intention to recommend to the Legislature that it empower the Public Service Commission to authorize an increase in the passenger fares not to exceed ½ cent per mile. These expressions, coupled with the recent fare decisions in the cases of the Rochester and Schenectady railways in New York, the Middlesex & Boston fare decision in Massachusetts and the Manchester fare decision in New Hampshire indicate that the public is beginning to realize the importance to its general welfare of a prosperous condition of its transportation companies.

METERS AND MANAGERS

In the issue of Feb. 27 we discussed under the heading of "Meters and Men" the desirability of judging the men with due regard to the number of stops. Another and really fundamental aspect of the car-meter problem is found in the different attitudes of the managers who buy electrical energy and of the managers who make it. Talks with the class first mentioned bring out the fact that they appreciate the energy-saving possibilities of the meter, and if they are not enthusiastic meter users they are at least ripe for a demonstration. On the other hand, talks with the second class develop a certain degree of skepticism. After all it is not difficult to account on purely psychological grounds for these differences in opinion. The manager who buys energy gets a distinct shock once a month when the power bill is presented to him for payment. Writing big checks is painful exercise. Therefore, anything that promises an immediate reduction is examined at once and will usually get a chance to make good. But where the railway generates its own power the effect of the meters is not so direct, although the saving might be in the same ratio. A difference of a few dollars in each of the many accounts of the power department would hardly be noticed on the individual invoices, yet the aggregate for a year would be very large. The fuel saving is the one large and conspicuous item, but even this would not reach its maximum until the operation of the power machines had been adjusted to meet the new conditions. Thus it is that one manager sees waste in all its hideous nakedness while from the sight of the other it is screened by a maze of accounting detail. Let the meter question be faced with an open mind, no matter what the power situation is. As we said years ago in these columns, it is as absurd to allow a motorman the unchecked use of electricity as it would be for an electric lighting company to discard meters and charge all of its customers a uniform rate independent of the amount of energy which they used.

THE AUTOMOBILE AND THE INTERURBAN

One of our subscribers, in calling our attention to the astonishing growth of the automobile industry, asks whether the 1,735,000 motor cars reported by *The Automobile* as being registered in the United States do not constitute a disturbing factor of serious import in our economic life. The figures are, at least, worth consideration, for the cost of these machines is approximately $1,500,000,000. Last year's output alone is reported to have been 515,000 cars with a value of nearly half a billion dollars, and the expense of operating the cars in service during the same twelvemonth may be estimated at another half billion.

Undeniably, these are enormous sums to be turned into the very restricted channel of a single industry, especially when it is considered that only about 7 per cent of the total number of cars in service can be classed as commercial, or useful, vehicles. Indeed, the manufacture of motor cars has now reached first place among the great "non-productive" industries of the world, as it absorbs without bringing anything definite in return, a far greater sum annually than is spent for tobacco, confectionery, or the "movies." As a means for diverting surplus cash from the savings banks it even exceeds, by a 20 per cent margin, the cup that cheers and sometimes (if taken with sufficient frequency) inebriates.

We shall not attempt here to analyze the economic effect of this expenditure of such a large part of the wealth produced annually in this country, nor attempt to decide whether it has increased the general cost of living, as has been claimed, or whether the greater part of the money thus spent is not simply diverted from other non-productive channels. We are more interested in the effect on the electric railway industry, and here the outlook is not altogether reassuring.

Competition from automobiles can come, of course, from the commercial car or the private car. So far as the former is concerned, we have already expressed our opinion that the independent car cannot compete with the trolley car in cheapness of operation, where the traffic to be carried is sufficient to warrant the installation of an electric railway system. For this reason, in all places where the franchise conditions for the two classes of transportation are at all equal, there is no great danger from the automobile bus.

With private cars the situation is somewhat different. In their case the electric railway company not only loses the fare of the owner of the automobile and of his family, when they make business trips, but often even those of his friends, when they are traveling in the same direction and the owner places the unoccupied seats in his car at their disposal. Both city and interurban roads report that they have lost some fares from this cause, but probably the interurban lines have lost most, owing to the many indirect restrictions on the use of automobiles in city streets, especially when congestion is present.

Unfortunately there is no direct way of determining the extent to which the interurban roads have lost passenger travel from this competition of the private auto-

mobile. However, in the strictly farming states of North Dakota, Kansas and Iowa there are respectively 7.5, 8.3, and 4.8 families per motor car owned, while in New York, Massachusetts and Delaware, where the population is largely an urban one, the corresponding figures are 12.7,11 and 15. Manifestly this indicates that the farmers are buying automobiles, and if they once have them they are likely to use them even though they may be a costly means for transportation.

As to what can be done to meet this new form of competition, the most obvious procedure (and apparently the only one) is to explain the facts to the public. The automobile offers the one great advantage of convenience, but to offset this the interurban offers speed and cheapness. Between towns an electric car ought easily to outrun a motor car in the hands of anyone but an expert or a lunatic, and for the light, cheap cars so generally sold in rural districts a speed of 30 m.p.h. is about the maximum under any circumstances. In the matter of cost, even the light automobiles will average some 6 cents per mile, at least, against the 1.5 cents or 2 cents charged on the interurban. If the farmer realized this, as he could be made to do by a small amount of publicity consistently and continuously applied, it seems reasonable to expect that, after the novelty of the automobile has worn off, it will cease to be a competitor except for very short distances or in the almost impossible cases where four or more people were invariably carried. On the other hand, the conveniences of the automobile will cause many people to reside in the country, a fact which should ultimately be of benefit to the interurban electric railway in both its passenger and freight business.

CALCULATION AND JUDGMENT

Last week under the caption "Relation of Theory and Practice" we pointed out what we consider the relative positions of "cut-and-try" and mathematical solutions of every day problems. The argument therein set forth was that better use should be made of the skill in calculating, which a large part of our educational system is designed to develop. We can go farther in this direction and state that skill in calculation is essential to progress. Its relation to the exercise of judgment, however, must not be overlooked. When a designer makes a study for a bridge truss he first assumes certain conditions of loading and calculates the proportions of parts to exactly meet these conditions, at the same time allowing "factors of safety" which his trained judgment dictates to be prudent. Calculating skill and practical experience thus go hand in hand.

Another example may be quoted from the electric railway field. A certain company wished to secure capital for an important extension. Well-considered plans were laid before the bankers by the railway engineer of way. The proposed rail section appeared light to the bankers, who referred to the practice of certain other roads in using much heavier rail. The engineer asked the bankers how they knew that the heavier rail section was better and received an evasive reply. In his turn he protested that he knew what he was talking about because he had calculated accurately the necessary size of rail. Of course the bankers, being good bankers, deferred to the engineer's judgment because it, unlike theirs, was based upon calculation. His contention was that, in this case at least, the lighter rail was safe and economical if the track was properly maintained, and he proposed to see that it was so maintained. This indicated that he was not blindly following the results of calculation but had considered all factors involved.

The whole matter can be summed up thus: Calculation must be the basis of judgment and not a substitute for it. Again, calculation enables one to pioneer on the frontier of industrial progress on the basis of past experiences. It is only a question of time when rule-of-thumb methods must be relegated to the limbo of inefficiency.

SYNDICATED WELL-POISONING

Railway men will read with mixed emotions the article on another page describing the circulation by a newspaper syndicate of articles deliberately fabricated to create anti-railway agitation. It is to be noted that these articles were not written to describe or to hit any particular situation; they were not inspired by abuses or bad service. They are "canned" agitation, prepared with a view to pleasing any editor anywhere who may find that the war news is getting dull and who is on the look-out for something more exciting. So far as we have observed, this matter has not had wide-spread circulation but has been published sporadically.

The fact of primary interest in this connection is that a syndicate is found to be circulating libels almost as comprehensive as the declaration that "all men are liars." And for the light thrown on one method of poisoning the well-springs of public opinion we cannot be too grateful. We have here a fine exhibit of how an anti-railway campaign may be started. The syndicate or "press association" sees a prospect of making a few dollars by capitalizing a belief that it will be popular almost anywhere to "roast" the electric railway company. If the idea appeals to the editor in goes the syndicate's plates. And the "war of the strap hangers" is on—on paper. The syndicate has made a dollar a column, and the newspaper has filled its space, but what about the reader and the railway? One has been swindled by a stereotyped fake, and the other has been exploited and defamed for the profit of the syndicate and the newspaper.

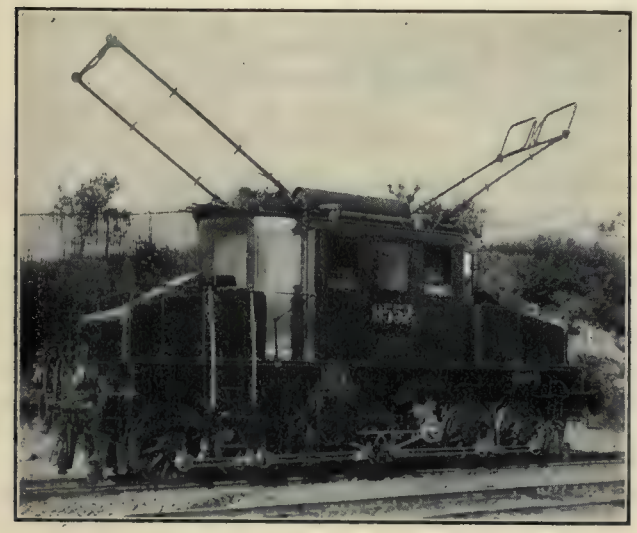
There is quite enough home-made agitation, with and without cause or reasonable basis. It is beyond toleration that agitation should be made to order and sold by the inch or the pound. The more important and influential dailies are not likely to print matter of this description, but wherever it appears it should be protested against and exposed. The typographical earmarks of ready-to-print agitation are not difficult to recognize. Wherever they are noted it will aid in exposing attacks of this nature to send newspapers containing them to the ELECTRIC RAILWAY JOURNAL.

Some Results of Italian Three-Phase Electrifications

The Writer Shows from Operating Curves and Statistics of the Original Giovi Three-Phase Electrification That Regeneration in Practice Has Saved $19,000 a Year at the Coal Pile Regardless of Brakeshoe and Other Savings

BY G. PONTECORVO, EAST PITTSBURGH, PA.

Some of the results of three-phase electrifications in Italy are already well known in this country, but some very interesting results and tests have recently been carried out by the Italian State Railway* and are worth a brief description. They were conducted on the old Giovi line, which is the most important of all the



THREE-PHASE IN PRACTICE—FIG. 1—STANDARD LOCOMOTIVE OF GIOVI LINE

lines electrified by the Italian State Railways on account of its heavy traffic and steep grades.

The three-phase electrifications of the State Railways in Italy now aggregate approximately 417 miles of track, and approximately 300,000-hp capacity of three-phase locomotives are already in service or on order. The electrified portion of the Giovi line is 14.4 miles long with 38 miles of track. It has a maximum grade of 3.5 per cent on a curve and has seven tunnels, of which one is 2.02 miles long with a 3 per cent grade. The importance of the line and the traffic handled on it are indicated by the statement that the electric equipment was designed for trains every ten minutes. The line has a parallel subsidiary which is also double track. This line is also electrified with the same system of traction.

THREE-PHASE ELECTRIC RAILWAY LINES IN ITALY.

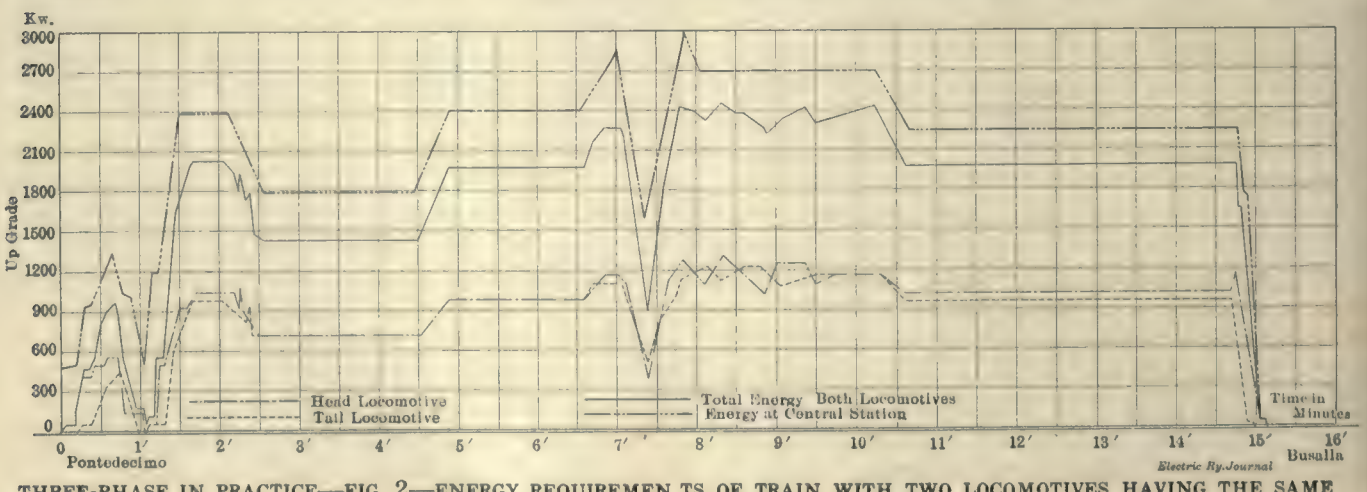
Lines.	Opened for traffic.	Length of Tracks in Miles. Single track.	Double track.	At stations.	Total.
Valtellina	1902	65.8		12.3	78.1
Giovi (old) including Branch Line	1910-1913		17.6	38.5	105.6
Giovi (subsidiary)	1914		15.5		
Savona-Ceva	1914	28.3		15.1	43.4
Monza-Lecco	1914	19.3	4.3	12.4	40.4
Mt. Cenis:					
Bussoleno-Bardonecchia	1912	14.7	10.5	12.4	71.7
Bardonecchia-Modane	1914		11.8		
*Simplon Tunnel	1907	12.4		1.9	14.3
Turin-Pinerolo	Being Electrified	23.6		7.5	31.1
†Sampierdarena-Genoa	"		3.7	3.7	11.1
Sampierdarena-Savona	"	24.3		10	34.3
Total length of tracks					431.5

*This line runs on Italian territory for half of its length only and is operated by the Swiss Federal Railways.
†This line is the connection of the Giovi lines to Genoa Stations.

Regeneration of Energy

The principle of the regeneration of energy by a polyphase induction motor is very well known and is common to other types of electric motors, such as the d.c. shunt motor. However, the induction motor has the advantage of greater simplicity of construction, allows the use of higher voltages and is more automatic in its operation. When a polyphase motor is inserted on a line, it will absorb electric power and deliver mechanical energy. But as soon as by external means the speed of the rotating part is increased above the synchronous speed, without having to change the direction of the field the motor will pump current back into the

*Revista Tecnica delle Ferrovie Italiane, Anno III, Vol. 5, No. 1. "Operating Results on the Old Giovi Line," F. Santoro and L. Calzolari.

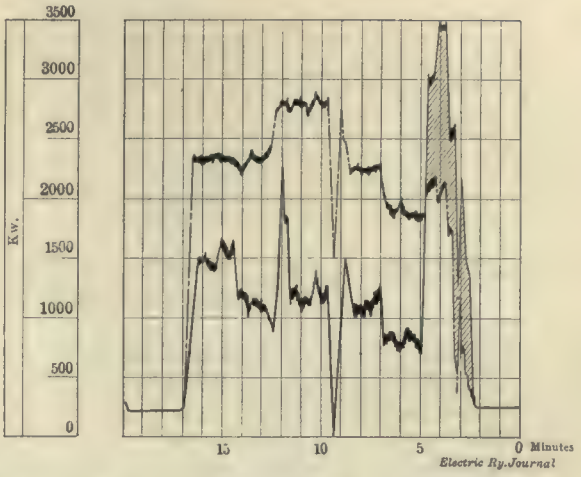


THREE-PHASE IN PRACTICE—FIG. 2—ENERGY REQUIREMEN TS OF TRAIN WITH TWO LOCOMOTIVES HAVING THE SAME WHEEL DIAMETER AND WITH RHEOSTAT SHORT-CIRCUITED

line. This characteristic of the induction motor is playing a very important part in railway electrification, as shown by the results hereinafter described. The tests to which we shall refer have been made principally on the Pontedecimo-Busalla section, or the one with the steepest grades on the old Giovi line.

The locomotives, Fig. 1, used have the following characteristics: Five coupled axles; weight, 60 metric tons, all available for adhesion; two 3000-volt, fifteen-cycle, three-phase, 2000-hp motors; motors which can be connected in cascade or in parallel to obtain two speeds, namely 14 m.p.h. and 28 m.p.h. The contact line is at 3000 volts, and the motors are used direct on the line and without transformers. The main transmission line is three-phase, 13,000 volts, with four substations each equipped with four single-phase transformers, 13,000/3000 volts, of which one is a spare. The central station is near Genoa and has two 6000-kva turbo alternators.

If now we compare the energy absorbed and regenerated by a train of normal composition when running at 28 m.p.h. and at 14 m.p.h., we find from actual runs that the regenerated energy represents respectively 47 per cent and 46 per cent of that absorbed by the train when going up grade. For a train hauled up grade by two locomotives at a speed of 28 m.p.h., with the expenditure of energy shown in Fig. 2, the regenerated energy amounted to 54.5 per cent of the absorbed energy; that is to say, on this section of the line the trains coming down grade regenerate more than half of the energy they absorb when going up grade. If we assume only two trains on this section, one ascending and one descending, Fig. 3 shows respectively the energy absorbed, the energy regenerated and the difference between the two.



THREE-PHASE IN PRACTICE—FIG. 3—PROPORTION OF ENERGY ABSORBED AND REGENERATED

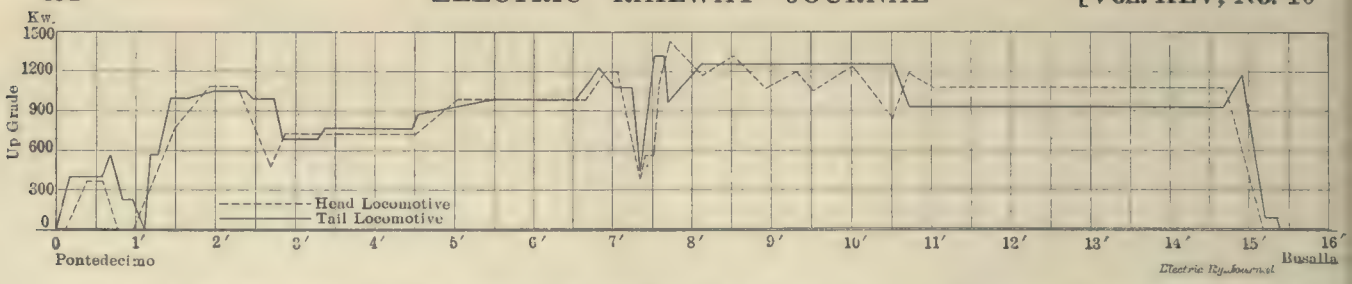


THREE-PHASE IN PRACTICE—FIG. 4—WATER RHEOSTAT AT CENTRAL STATION DISSIPATING REGENERATED ENERGY

But, as already mentioned, the really important figures are those which represent the saving effected by regeneration in the energy produced at the central station. This saving, of course, depends on the total traffic in both directions and on the way the schedule is arranged for a given service. The Giovi line is not particularly fortunate in this respect, as most of the traffic is in the up-grade direction, the trains on the down grade being composed mostly of empty cars. The energy generated at the central station for a train service according to schedule with and without regeneration of energy on the trains down grade shows a saving for the former of 3160 kw-hr., or $3160 \div 22{,}650 = 14$ per cent of the generated energy. Although this energy is not a very large amount, yet the saving in actual money is fairly large as the electric energy is produced by a steam plant and the cost of coal in Italy is rather high, approximately $6 a ton. In this case the saving for a year was 3166 tons, or approximately $19,000. All this shows the distinct advantage of polyphase motors for this class of service as they are highly efficient, can develop very high torques and are very light.

ADVANTAGES OF REGENERATING APPARATUS

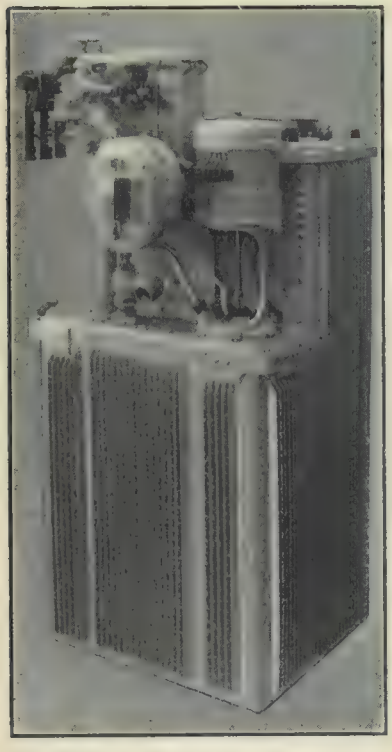
There are many cases where a three-phase electrification, if properly arranged, can take care of an enormous traffic with a very small central station and a minimum expenditure of energy. We refer particularly to lines with steep grades where most of the heavy traffic is on the down grade. But regeneration has other advantages, of which one is a reduction in the size of the generator at the central station and a better load factor on it and on all of the auxiliary apparatus. Another is the saving in brakeshoes and in the wear of the rolling stock. Trains driven by a three-phase locomotive when going down grade and regenerating do not need to use any brake. Brakes are used only for coming to a dead stop quicky and for safety. When regenerating, the locomotive cannot exceed the synchronous



THREE-PHASE IN PRACTICE—FIG. 5—RHEOSTATIC REGULATION OF LOAD OBTAINED WHEN THE DIFFERENCE IN THE WHEEL DIAMETER OF THE TWO LOCOMOTIVES WAS 1.41 IN.

speed plus the slip, which is but 2 or 3 per cent, and the composition of the trains on the down grade is such as to regenerate an energy equivalent to that absorbed on the up grade.

For a short time the electric service on the Giovi line was operated without regeneration, as the safety water rheostat of the central station was not ready for operation, and during this time the average life of the locomotive brakeshoes was 7455 km, or 4620 miles. Since regeneration began the average life of brakeshoes has increased to 22,969 km (14,200 miles), or more than three times. The locomotive has twelve brakeshoes, and as the saving includes not only the cost of the shoes themselves but the cost of replacing them in labor and time saved by keeping the locomotive in commission the gain is considerable.



THREE-PHASE IN PRACTICE—FIG. 6—LIQUID RHEOSTAT

Under normal conditions the safety water rheostat of the central station is never in operation, but it is a kind of safety valve to take care of the regenerated energy at the central station should this energy be larger than that absorbed. Such a condition can occur through a disarrangement of the schedule by which more or heavier trains will be descending than those ascending.

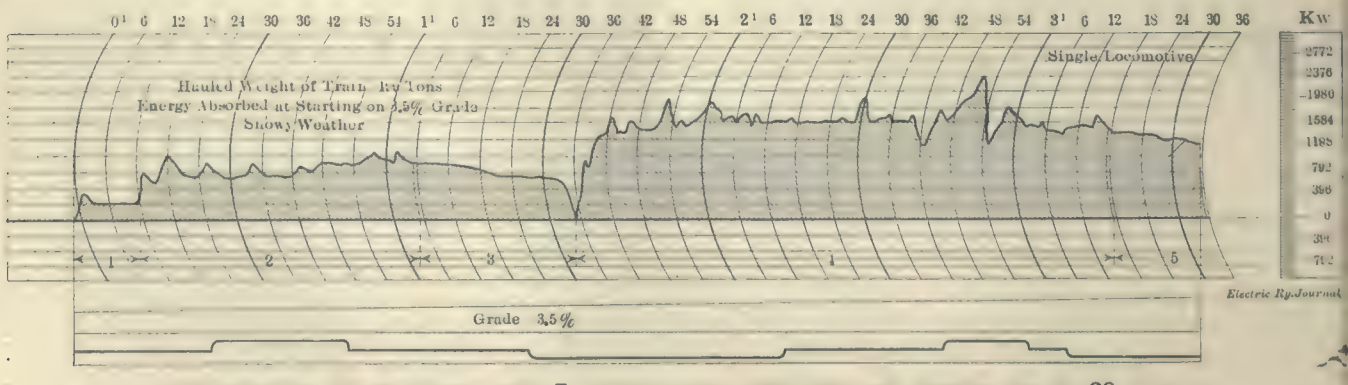
The rheostat consists of three clay tubes, through which condensing water can circulate. Three bare copper wires connected to the primary line at 13,000 volts are brought in contact with the water circulating in the rheostat. A small induction motor automatically opens the valve to admit the condensing water every time energy is sent back to the central station from the line, the rheostat being connected in parallel with the generators. This rheostat is situated in a pit in the central station, Fig. 4, but of course for most of the time is not in operation.

Other advantages of electric braking are the increased life of rolling stock, especially of couplings, due to the smooth running down grade at constant speed.

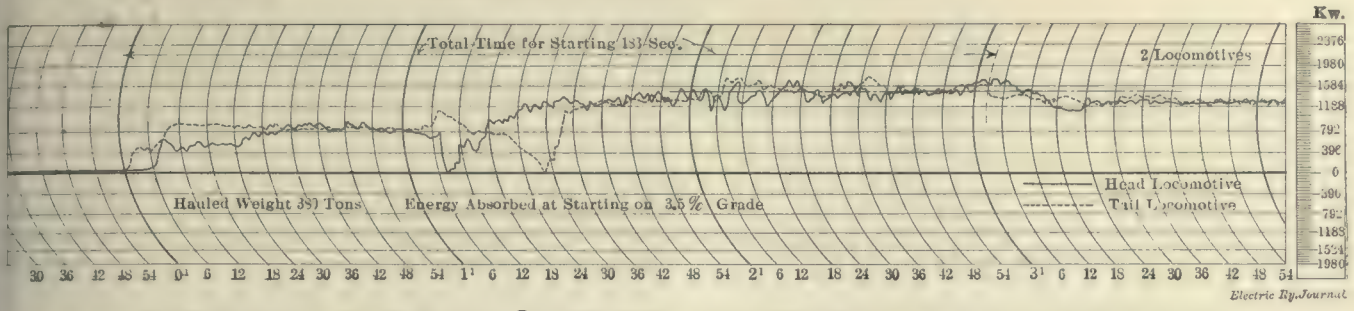
Last but not least is the record of interruptions. During the year 1911-1912 there were only five interruptions of supply in excess of ten minutes. Not one reached an hour, thus showing that the regeneration of energy gives better operating conditions because of the reduction effected in peak loads.

Equalization of Load on Trains with Two Locomotives

Some doubts have been expressed, even by electric traction engineers, as to the operation of three-phase locomotives in multiple, in case there should be a wide difference in the wheel diameters of the locomotives. It has been held that such a difference would distribute the load unequally. This problem has been solved by the employment of the liquid rheostat used to start the motors. When a train is being hauled up grade by more than one locomotive, the rheostat is not fully short-circuited in the locomotive with larger wheel diameter, and when two locomotives are operating on the down grade (and regenerating) the rheostat is not fully short-circuited on the locomotive with the smaller wheel diameter. How close it is possible to equalize the load on the locomotive by this method is shown by Fig. 5. Fig. 2 shows that the load is well equalized on two locomotives (one pulling and one pushing) of the same wheel diameter. The same applies when the locomotives are regenerating. Fig. 5 shows an extreme case, the two locomotives having 1.41 in. difference in wheel diameter. Even then the difference of load



THREE-PHASE IN PRACTICE—FIG. 7—REGULATION OBTAINED FOR SPEEDS UP TO 28 M.P.H.



THREE-PHASE IN PRACTICE—FIG. 8—OPERATING CHARACTERISTICS OF A TWO-LOCOMOTIVE TRAIN

(average) was less than 2 per cent with an instantaneous variation of 8 per cent. Of course this method of equalizing the load requires a small loss in the rheostat, but as in actual practice the difference between wheels is seldom very large, this loss is practically negligible. As this method does not require any complicated connection or difficult operation or a train line between the two locomotives, it can be considered very satisfactory.

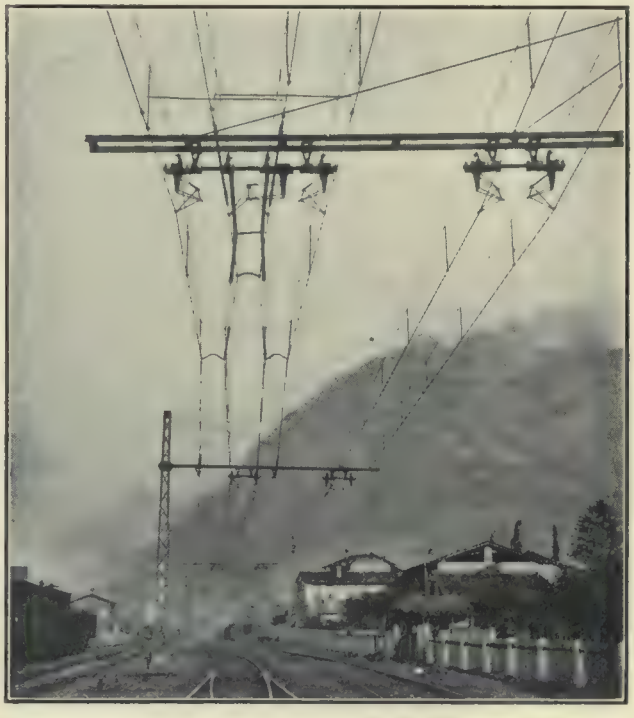
ANALYSIS OF STARTING CONDITIONS—USE OF LIQUID RHEOSTAT

The operation of a three-phase locomotive is extremely simple. Apart from the air brake, which, as noted, is never used except to bring the train to a stop or for safety in case the locomotive cannot regenerate on a down grade, the motorman has only two handles to operate. The first handle is used to insert the motors on the line and connects them in series or parallel. It operates the main controller for making motor connections by means of an electro-pneumatic relay, but the main controller never operates under load. The other handle operates the liquid rheostat, Fig. 6, and the automatic regulator connected with it. This regulator controls the level of the water in the rheostat in such a way that for each position of the handle the power absorbed from the line is kept constant at any desired value. Figs. 7 and 8 show the exactness of regulation maintained. Fig. 7 shows the starting condition up to 28 m.p.h. on the curve section of the Giovi line with a 3.5 per cent grade for a train of 190 tons hauled by one locomotive.

This test was taken with snow on the ground and, therefore, under unfavorable conditions for traction. An examination of Fig. 8 shows that to accelerate the train from zero up to full speed required 183 seconds, and in this diagram five different periods can be observed, as follows: (1) Insertion of motors on line and opening of brakes; (2) starting up with motor connected in cascade up to 14 m.p.h.; (3) running at 14 m.p.h.; (4) changing over to parallel connection of motors and acceleration up to 28 m.p.h.; (5) running at 28 m.p.h.

It will be seen that the time necessary for changing over from cascade to parallel connection is extremely small, so that the reduction in speed of the train is negligible. Again, the absorbed energy was kept nearly constant during the entire starting period by means of the automatic regulator in the liquid rheostat. This allowed the locomotive to keep safely near the limit of adhesion without causing high peaks in power demand.

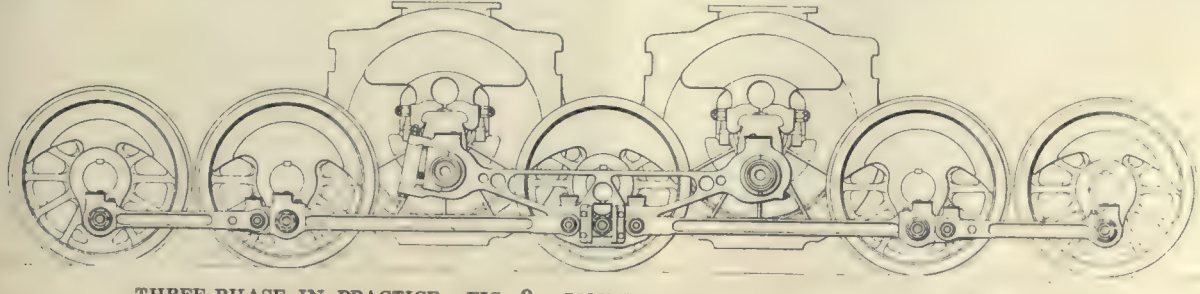
Fig. 8, which is a curve for a train with two locomotives starting on the same section of the line, shows that the total time was 183 seconds. It will be noted



THREE-PHASE IN PRACTICE—FIG. 10—OVERHEAD WORK ON THE LECCO-CALOLZIO LINE

that there is a good equalization of loads between the two locomotives and no sudden stresses in the train when either of the two locomotives changes over from cascade to parallel. The diagram also shows that for starting this train on such a heavy grade only 16.5 per cent more energy was required than was needed when running on the same grade. This is due chiefly to the automatic regulation by which the torque is kept below the point of slip.

Experiments on this section of 3.5 per cent grade with trains of increasing weight up to 450 tons with two locomotives, or a total weight of train of 570 tons,



THREE-PHASE IN PRACTICE—FIG. 9—CONNECTIONS OF MOTORS TO DRIVING WHEELS

show a coefficient of traction of 1/4.5 = 0.222. The two speeds, 14 m.p.h. and 28 m.p.h., for this heavy freight service have shown themselves quite suitable for all operation. For yard switching, the speed of the locomotive can easily be regulated by means of the liquid rheostat.

Other Developments

The results obtained on the Pontedecimo-Busalla line are more striking than those obtained on other railways but only in degree. On the Valtellina line, in operation since 1900, the three-phase locomotives, built by the Ganz Company and designed by K. de Kando, show the same advantages due to the regeneration of energy, etc., and electric traction has reduced the operating expenses on this line by 12 per cent.

During the last fourteen years the three-phase locomotive has had a notable development, and the two latest large locomotives built by the Società Italiana Westinghouse for the Italian State Railways are designed to solve the high-speed (62 m.p.h.) passenger service** as well as the heavy freight traffic.

The necessity for two overhead wires has not proved a serious objection in practice. The two Giovi lines, the Mt. Cenis, the Simplon, the Valtellina and the Savona Ceva, are all naturally unfavorable for overhead construction because of many tunnels, very sharp curves, reverse curves, heavy grades and stations with many sidings. Yet no inconvenience has been experienced because of these matters.

The line potential of 3000 to 4000 volts used in Italy seems to have proved very satisfactory. The winding for large motors for this voltage does not present any difficulty from the insulation point of view. The locomotive apparatus is of such simplicity that the voltage of 3000 is not dangerous, especially as no connections are made under load and the motorman does not handle any apparatus under line voltage. Again, the choice of this voltage allows the line current to be kept at about 400 amp, which can be easily collected by the trolley. The low frequency, 15 to 16 2/3 cycles, allows the motors to be wound for a low number of poles like four, six or eight, which gives a good power factor and permits direct-connection to the wheels without gears, as shown in Fig. 9. The connection is made through the very satisfactory means of a Scotch yoke. Another characteristic which is considered one of the weak points of the three-phase system is the limitation of speed. Yet the fact that the synchronous speed of the locomotive cannot be increased by the motorman has a great advantage. In the preparation of schedules the speed of the train is often made less than that permitted by the track, weight of trains, rolling stock and signal installations, so that the motorman may have opportunity to make up time when the train is behind schedule. As this cannot be done with three-phase locomotives it follows that the electrification can be designed with safety for the maximum speed and that the capacity of the line can thereby be increased.

A slight increase in the speed of all locomotives is then sometimes possible by increasing the frequency at the generating plant. This can be done, as in the Giovi locomotives, by designing the motors and generators for 15 and 16 2/3 cycles—a fairly easy undertaking, because the overload capacity of three-phase motors wound for a small number of poles is such as to allow the reduction in field strength due to the increase in frequency. The lightness of the locomotive due to the three-phase motors and to the absence of transformers, the motors being wound for high voltage, is also a very striking feature and makes the system especially valuable for mountain roads.

**See Electric Railway Journal, Feb. 6, 1915.

Employment on City Lines

New York City Board of Education Is Conducting a Series of Vocational Lectures in Which One Was Delivered Recently by H. A. Bullock

Under the title "Opportunities for Employment in a Great Urban Transportation Company" H. A. Bullock, secretary New York Municipal Railway Corporation, delivered a lecture on Feb. 15 in New York, under the auspices of the bureau of public lectures of the Board of Education. It was one of the vocational series.

He stated that a street railway is essentially a co-operative enterprise, two most essential conditions in the success of the management being the maintenance of a spirit of co-operation and the establishment of administrative methods to facilitate it. An illustration of the co-operative spirit was given last winter's snowstorm. The Brooklyn Rapid Transit Company had all of its eighty-three plows and sweepers in continuous service and, in addition to its regular force of track laborers, had a special snow-fighting force of 1500 men. These worked in shifts until through the turning of the snow to rain, and the rapid and deep formation of ice the difficulties became almost insurmountable. The men who manned the sweepers and those on the plows worked uncomplainingly and their fellows on the uniformed force at the depots volunteered by the score to shovel snow when the snow-fighting force finally succumbed to the elements. The superintendents in charge worked just as hard as the men until the storm was conquered after two days of fighting.

Mr. Bullock stated that when a candidate applies for employment with the company his personal record is inquired into, his references are investigated and he is subjected to a thorough physical examination. He is then sent to the schoolroom for a week's instruction followed by an instruction week on the road. He next goes on the extra list at a depot, continuing for three months as a probationer under the eyes of a force of specially selected men known as the line inspection force. At the end of the probational period his record is examined and he is either rejected or given permanent employment. After this a system of credits and demerits is used to determine eligibility for promotion in the ranks and to positions as starters, dispatchers or inspectors. The administration of the disciplinary system is keyed up to a standard of instruction and correction rather than to one of punishment.

For the benefit of the men the company maintains club rooms in the depots, in some of which are restaurants where food is offered at prices corresponding to those in dairy lunch rooms, a good meal being obtainable for 25 cents. These club rooms are operated by the Employees' Benefit Association, which is the principal medium through which the social activities of employees find expression. It operates a comprehensive sick and death benefit plan, paying out to its members more than it receives in dues, the difference being made up from the revenue of more than $17,000 per year from the pool tables and bowling alleys. There are about 8500 members in the Employees' Association out of about 14,000 employees in the service of the company. The company supplies baseball regalia to its men and last year a regular league containing fourteen teams was organized in the transportation department. The medical department is well organized and the company doctors are always on the lookout for incipient disorders which may become chronic. In the first year of its operation, 1913, the medical system produced a reduction of about 24 per cent in the number of days lost by the operating employees on account of illness, a saving of 18,000 days' time.

Annual Convention of C. E. R. A.

The Sessions on Friday Were Devoted to a Discussion on Safety and to Business Matters—Abstracts of Papers Read at Both Sessions Are Published

The Friday morning session of the Central Electric Railway Association's annual meeting, held at Indianapolis, Feb. 25 and 26, inclusive, was attended by more than 100 members. President Schneider opened the session with the announcement that applications for membership had been received from thirteen supply men and would be acted upon by the executive committee. The next order of business was a paper on "Safety" by Dana Webster, inspector accident and liability department Aetna Life Insurance Company, Indianapolis, Ind. This paper is published in abstract on another page. In introducing Mr. Webster, President Schneider said that his paper dealt with a subject which was very necessary to the electric railway business, since it offered a means of reducing expenses which were non-productive.

In the discussion which followed A. G. Olberding, American Brake Shoe & Foundry Company, emphasized the importance of obtaining the co-operation of employees in safety work. His experience had been that the employees' committee should be changed about every two months so as to bring as many into the safety work as possible. In closing he stated that the wave of safety which has swept over the country has resulted in the expenditure of many thousands of dollars which have eliminated a large percentage of common accidents. Unfortunately, however, the insurance rates for accident liability had not been reduced in proportion to the number of accidents.

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, continuing the discussion, said that one of the weak points in liability insurance was the practice of the insurance companies of paying for claims where the injured party was alone responsible for the accident. Mr. Henry was of the opinion that this practice encouraged the filing of claims which otherwise would not cost more than the fees paid to the attending physician.

H. A. Nicholl, general manager Union Traction Company of Indiana, outlined the safety organization and methods used by his company. His organization essentially consists of a general safety board made up of the heads of departments and executives, with a number of local safety committees at central points. He stated that frank criticisms of the acts of the different departments was encouraged among employees with good results. In order to promote esprit de corps banquets are held periodically, where addresses are made by company executives, department heads and the chairmen of the local safety committees. Mr. Nicholl said that these banquets had brought forth addresses by employees which were surprisingly good. During the summer months employees' picnics were held and baseball teams were organized among the employees at the various headquarters along the line. In conclusion he stated that his company felt that the results obtained justified the effort and expense.

W. A. Carson, general manager Evansville Railways, stated that his company had a safety committee organization similar to that described by Mr. Nicholl, but that one-half of each local committee were changed every six months. His experience had been that it was difficult to get the employees to send in safety suggestions, particularly at the beginning of the work. In order to have a complete understanding a meeting of all the employees was called, where the purpose of the campaign and the need of safety suggestions were explained, with the result that he now has the co-operation of all the employees. Despite this, interest lagged at times, and safety suggestions were few. It appears that the failure to adopt the suggestions of some discouraged them so that the plan has been adopted of explaining to each employee whose suggestion had been rejected why that decision was reached. Mr. Carson also stated that he made it a practice to pay the employees for the time during which they attend the safety committee meetings.

T. W. Ketteman, Ohmer Fare Register Company, said that his company had been able to increase the number of safety suggestions by eliminating the names of the employees until the suggestion had been approved. Safety suggestion boxes have been installed in the different shop departments. The names of the employees offering suggestions were not known to the board or committee passing on the suggestion until the award was made. The secretary of the safety board opened the safety suggestion boxes, and he was the only one who was permitted to know the names of employees making suggestions. The same practice was adopted in regard to complaints, and it has been found that the elimination of the name encourages better results and excludes friction between employees and departments.

W. Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company, said that the biggest factor in the safety movement was that of making the employees think. Many accidents could have been avoided if employees had just thought or had been disciplined to keep their minds constantly on their work.

Business Session

Following this discussion President Schneider called for the report of Secretary-Treasurer Neereamer. This was published on page 413 of the issue of last week. Following this report, the president addressed the association briefly and thanked the members for their co-operation in making the year's work a success. At this point the report of the nominating committee was received and approved, and the following officers were elected for the ensuing year:

President, Charles L. Henry, president and general manager Indianapolis & Cincinnati Traction, Indianapolis, Ind.; first vice-president, A. Benham, general manager Ohio Electric Railway, Springfield, Ohio; second vice-president, C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.; treasurer, A. L. Neereamer.

The new executive committee consists of the following members: E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; H. A. Nicholl, general manager Union Traction Company of Indiana; W. A. Carson, general manager Evansville Railways; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction; R. A. Crume, general manager Dayton & Troy Electric Railway; H. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway; J. F. Keys, general passenger agent Detroit United Railway; F. D. Carpenter, general manager Western Ohio Railroad; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction; S. D. Hutchins, Westinghouse Air Brake Company, and W. H. Bloss, Ohio Brass Company.

It is planned that the next meeting of the association will be held on June 17 and 18, 1915, and if enough members will take part, a boat will be chartered for a forty-eight-hour trip from Cleveland to Buffalo and return. Both the railway and supply members voted unanimously for the boat trip meeting.

On Thursday evening, Feb. 25, the members of the association and their ladies were the guests of the Drew Electric & Manufacturing Company in a theater party given at Keith's Theater. On Friday afternoon, Feb. 26, about seventy-five members of the association were the guests of the Prest-O-Lite Company, Inc. The trip to the plant was made on two special cars furnished by the Terre Haute, Indianapolis & Eastern Traction Company. At the plant the members inspected the manufacture of prest-o-lite and the pressed-steel holders. After following the various processes through the plant, the Indianapolis speedway, which was nearby, was inspected.

Abstracts of Governor Ralston's letter and of addresses presented at both sessions follow.

LETTER FROM THE GOVERNOR OF INDIANA

Hon. Samuel M. Ralston, Governor of Indiana, sent a letter to President Schneider of the association, which was mentioned briefly in the report of the meeting last week. Governor Ralston said in part:

"Both as a citizen and as an official, I am greatly interested in the business in which you are engaged. The work of the common carrier has grown to such proportions in this country and is so intimately associated with the country's welfare that when it ceases to be profitable, the injurious effects are immediately apparent. For the last few years it has been the contention of the railroad and interurban interests of the country—especially in Indiana—that the passenger fares allowed by law are not sufficient to cover the expenses incurred in passenger traffic. This point has been pressed with much vigor upon the public mind, and at this time there is a bill pending before the Legislature of Indiana proposing to fix the passenger fares at 2½ cents per mile.

"On all hands it is agreed that all railroads and interurbans are expected to furnish the best service possible in consideration of the charges they are permitted to make therefor. Generally speaking, there is no complaint on the part of the public of the character of service furnished, but it is the contention by these companies that their passenger traffic is losing them money. If this be true, it is not as it should be. So long as the public demands a high grade of service it should be willing to make that service possible on the basis of a reasonable profit to those furnishing the service; and, broadly speaking, I think the public is willing that this should be done.

"The difficult question is, however, What are the facts? Does the service rendered the traveling public for the charges permitted in Indiana make it impossible for the railroads and interurbans to realize a reasonable profit? If the ex parte statements of the railroads and interurbans can be taken as the truth, this question must be answered in the affirmative. I believe it is conceded that the increase in passenger fares sought by these roads would yield them in Indiana approximately $500,000 a year. This is a large sum of money; too large, I think you will agree with me, for representatives of the people to authorize the railroads to collect from the people on the ex parte statement of the interested party. I am not insinuating that this ex parte statement is or would be erroneous, but I believe that the question it seeks to influence favorable action upon is of such vast importance to the public that no official, either in executive or representative capacity, would be warranted in acting favorably upon it without hearing from both of the interested parties. It would be difficult, if not impossible, for the present Legislature at this late day, with all the other work demanding its attention, to take up this important subject and give it a thorough investigation and come to an equitable conclusion.

"Personally I am friendly to these great properties, and I know the people of Indiana are. I want them to receive a fair profit for their service and to succeed; but this should be done on a basis that will be fair, so far as it is possible to arrive at such a basis, to both the roads and the public.

"With this idea in view, it is my intention to recommend to the Legislature that it empower the Public Service Commission of Indiana to authorize an increase in the passenger fares in this State not to exceed ½ cent per mile. The commission should, of course, make an investigation of the conditions of any road, upon its filing a petition with the commission asking for an increase of fares. This petition should contain such facts as would warrant such increase and as may be required to be set forth therein, under a rule of the commission; and it may be the showing made by some roads in support of their petitions will be so conclusive of the question at issue, although ex parte, that but little additional evidence will be required by the commission. This course it appears to me, considering the circumstances of the case, will best promote an intelligent settlement of this difficult public question; one, too, in which all the factors of a political nature or party advantage will disappear."

ADDRESS BY HON. THOMAS DUNCAN

Hon. Thomas Duncan, chairman Public Service Commission of Indiana, began his address by referring to the condition of the interurban electric railways in the State, and saying that the volume of the business conducted by this class of lines, their readiness to serve the public at many places and at frequent intervals, and the strength of their cars. He commended the plan of holding annual conventions for the consideration of mutual interests, as he believed the time has passed when a competitor can hope to outstrip his rival by secret means or undermine him by silent encroachment.

He then analyzed some of the causes of the present business depression, and its moral, as he saw it, was the homely old maxim, "Live within your income." He said that the people of Indiana were proud of the achievements of those who invested in electric railway properties, and, if he read the times correctly, there is among the people of the State a friendly feeling toward these properties. There prevails a general solicitude for the welfare of the business and a desire to be helpful at this time. In return for this helpfulness, however, the people demand absolute honesty, the highest efficiency consistent with prudent economy and a faithful public service. This public service does not favor the increase of the revenues of the companies to fill their coffers and make them rich but to furnish sufficient revenues to save them from distress and ruin in a time of general business depression. The public is willing to pay a reasonable return upon the fair value of the property that has been prudently provided for the performance of a public service. The people are willing to forego any further expenses for what might be adequately termed the luxuries of transportation and are only demanding that they be carried in safety by the transportation companies.

Mr. Duncan then presented a summary of statistics from the reports filed with the Public Service Commission of Indiana for the year ended June 30, 1914. He

said that the roads so reporting at that time had outstanding the following capital liabilities:

Common stock	$81,587,291.67
Preferred stock	39,996,510.00
Funded and floating debt	104,869,134.05
Total capital liabilities	$226,452,936.72

There was paid in dividends the following amounts:

On common stock	$139,335.00
On preferred stock	400,802.11
Interest debts of leased roads	2,049,622.82
Total	$2,589,759.93
Interest accrued during year	$3,925,928.46

The book value of the entire lines June 30, 1914, was $207,328,208.42.

The total operating revenues for all these lines were as follows:

Passenger revenues	$16,736,164.21
Freight revenues	1,223,716.80
All other operating revenues	606,241.43
Total	$18,566,122.44

Revenues from other than operating sources increased this total to $19,188,610.77.

Of all the revenues of the interurban lines 86.06 per cent was derived from passenger transportation and 7.68 per cent was derived from freight transportation. The four street railway systems derived from passenger transportation 92.7 per cent, 97.8 per cent, 98.6 per cent and 98.6 per cent of their revenues, respectively.

There was expended in operating expenses $11,580,787.08, or slightly more than 60 per cent of the total revenue. This sum was divided as follows:

	Total	Per Cent
Maintenance of way and structures	$1,974,315.98	17.04
Maintenance of equipment	1,285,971.80	11.10
Traffic	113,649.61	0.98
Conducting transportation	6,230,502.98	53.80
General and miscellaneous	1,976,346.71	17.07
Total	$11,580,787.08	100.00

There was paid for superintendence of transportation about $236,248.05. Payment for injuries and damages required $556,877.75 during this year. Trainmen received $2,453,968.96, or 21.19 per cent, of the operating revenues. This is a little over 12.7 per cent, or more than one-eighth of all revenue received.

After defraying the operating expenses of these various lines there was left for the industry $7,607,823.69. There accrued during the year interest liabilities against these companies in the sum of $3,925,928.46. There was also a fixed charge for taxes, the aggregate of which was $1,010,464.31. The sum of these two items is $4,936,392.77. Deducting this sum from $7,607,823.69 leaves $2,671,430.92, as the net return of this industry for that time. This would pay a dividend of 6 per cent on the $39,996,510 of the preferred stock of the electric railways and leave nothing for dividends on the common stock, or it would pay 4 per cent on the preferred stock and leave practically 1 per cent for common stock. This, Mr. Duncan said, was not an inviting picture from the standpoint of the investors, even if a certain percentage of the common stock represents water.

Analysis of Return on Investment

Continuing, Mr. Duncan said in part:

"These properties are private properties clothed with a public interest subject to the reasonable regulation of the State but with the management of this left largely to the owners. The public is under no obligation to protect the investors. It does not guarantee returns or underwrite investments in electric railway properties. Its duty ends by paying, above operating expenses and taxes, including depreciation, such a sum as will yield a fair return upon the reasonable value of the property used and useful for the convenience of the public. Tested by this rule let us reason together.

"After the payment of taxes and all operating expenses for the year 1914 there was left from the earnings $6,597,359.38.

"The total mileage of the electric railways reporting to this commission is 3099.93, or, for practical purposes, 3100. This surplus would yield a return of 5 per cent on a value of $42,583 per mile. It would yield a return of 6 per cent on a value of $35,469 per mile. It would yield a return of 7 per cent on a value of $30,402 per mile. It is believed, that when the interurban railways of the State are placed on the copper-zone basis, the revenues of these roads, considered as a whole, will yield a return of 6 per cent on a valuation of the roads at between $35,000 and $40,000 per mile.

"Our commission has not yet been able to complete the valuation of a single line of interurban road. Our engineers have been for some time engaged in the valuation of the Indianapolis, Columbus & Southern Traction Company. The reports, however, show that six of these roads are capitalized at less than $40,000 per mile and twelve are capitalized at less than $50,000 per mile. The total operating revenues of the interurban lines was 30.34 cents per car-mile, and the average operating expenses of these lines was 18.30 cents per car-mile.

"It is my judgment that the people of the State served by these lines have very little reason to complain of unjust charges and of inadequate services. We have encouraged the change from the nickel to the penny zone. This we have done upon the theory that it was more equitable to the passenger and would add something to the revenues of the company. But one line so far has actually changed the basis of its fares.

Basis of Rates to Be the Cost of Service

"Unless I have misapprehended the spirit of recent legislation touching public utilities, it means that ultimately the basis of all rates will be the cost of the service rendered. This will not be adverse to the prosperity of the electric railway business, unless the electric lines are overwhelmed by competition arising from the activities of its younger competitor. For, if rates were to-day based wholly upon a just and reasonable return of the actual value of the properties used, it is my judgment that there would be no reduction in the rates for the transportation of either freight or passengers. It is my further judgment that these roads are now entitled to at least the increased earnings that would follow the penny-zone basis of fares. But it is also my opinion, that when the rate for the transportation of passengers is fixed at 2 cents per mile, these roads will earn a net return of at least 6 per cent on the fair value of any one of the interurban lines. A further increase of fares above the penny-zone basis would probably add nothing to the revenues of the electric carriers, while the rate for the steam passenger carriers remains at a maximum of 2 cents per mile.

"The spirit of the age is not philanthropic. It does not pay fares for the sole purpose of assisting the carriers, nor do the carriers establish and operate their business for the sole purpose of rendering a public service nor for the purpose of adding comfort and convenience to that part of the public which desires to travel. The age is largely utilitarian. The people are constantly endeavoring to secure adequate service at the least reasonable rate. The carriers are with equal pertinacity endeavoring to obtain the largest return that is practicable to earn upon the investment in the property.

"So long as the public and the carriers assume toward each other the attitude of opposing interest, so long the day of justice will be deferred. The interests are not opposing but are identical, and when I say the age is utilitarian, I do not mean that the people or the utilities have lost any of their sense of justice. I am not a believer in the idea that the golden age is in the past. On the contrary, I am firmly of the opinion that each generation lives in a golden age. I am optimistic. I believe that in the business world and in all relations of life there were never greater opportunities than there are at the present hour. We have the embarrassment arising from a temporary depression in the business world, but this can only be the shifting of clouds in front of a splendid sun. With the unbounded resources of this country, with its splendid people and with the best government in the world, we have no reason to complain and no reason to insist that at any other time or in any other age there were opportunities better than there are at this hour.

"There has been less criticism of the conduct of the interurban railways in this State than of any other public utility under the jurisdiction of our commission. There have been complaints from private individuals in an informal way against a number of the street car lines, but no formal proceeding has been filed on this subject before the commission. It is a pleasure to note that the managers of these properties have shown a friendly disposition toward the law, and a spirit of co-operation with the commission. I do not recall that we have at any time asked any one of the managers of these properties for information that has not been cheerfully given, even though at times granting the request necessarily incurred some inconvenience and some expense.

"I do not believe that State regulation of the electric railways has been harmful to the industry. On the contrary, I think it has been helpful. Whatever of present embarrassment encompasses some of the lines is not chargeable to the State regulation of public utilities nor to the administration of the regulatory laws. I am firmly convinced that the electric railway business has no greater discouragements and encounters no greater adversities than any other great business has encountered in its infancy. After watching with as much care as the manifold duties of my position would permit for a period of nearly two years the management and the conduct of the electric railway business in this State, I feel that the people of the State are proud of these properties, and that the owners and managers, as a whole, have no just grounds for complaint. The business can be established on foundations of permanent and continued success only by the attainment of such efficiency as will render to the public such services at such reasonable rates as just men ought to appreciate and be willing to pay.

Responsibilities of Railways

"I am convinced that the public, and even the managers of these properties, have underestimated the great responsibilities this industry assumes. When we reflect upon the fact that in one single year more than two and one-half times the population of the United States entered and alighted from the cars of the electric railways of Indiana, we begin to comprehend the tremendous responsibilities this business carries. The safety of all that Indiana respects, honors and loves is confided to you many times during the year.

"As a commission we will enforce the laws in a spirit of justice, without fear and without favor, and you will observe that, in so far as any one but the utilities themselves are concerned, the law moves only against transgressors.

"The only advice that I could give to you at this time would be to husband your resources with the most rigid economy, increase the efficiency of yourself and your employees by every method known to the industry, and at every opportunity inspire the public mind with a confidence in your integrity and in your unselfish devotion to the people's service. Realize as fully as you can a great fact often ignored, that public sympathy and a friendly public spirit toward you is an asset of supremest value."

ADDRESS BY DANA WEBSTER

Dana Webster, inspector accident and liability department Aetna Life Insurance Company, Indianapolis, read a paper entitled "Safety" at the meeting on Friday. Mr. Webster said, in part:

"It is the experience of every large employer, as well as other agencies which have taken an active interest in accident prevention, that, if a successful safety campaign is to be waged, a comprehensive organization to formulate and carry out a definite plan or program is absolutely essential. The necessity for organization in safety work is apparent when we consider the many-sided problem that is involved in accident prevention. Broadly speaking, it may be said to include as its chief branches:

"(1) Ascertaining the actual conditions of a risk under which employees in any institution perform each task and determining the practical possibilities of eliminating or reducing the risk.

"(2) The provision of proper working conditions and of efficient safeguards for dangerous conditions or for dangerous machinery and appliances.

"(3) The careful selection, instruction and supervision of workmen and their assignment to work for which they are not unsuited.

"(4) The promulgation of rules for safeguarding and their rigid enforcement.

"(5) The inculcation of habits of caution in the minds of all concerned.

"Workmen can well be selected for their caution as well as for their ability to do work. A reckless employee, no matter how skilled he may be, costs his employer more money than he is worth. Every employee should be carefully instructed in his work, not only in how to get results but in how to avoid danger to himself and others. The 'stitch in time' adage applies no place better than it does here. In assigning a man to work and in keeping him at it, his personal characteristics should always be duly considered.

"Another very important function in accident prevention work is that of impressing upon the employee the sincerity of the employer in his desire to prevent accidents. You cannot consistently ask the workman to do his share in accident prevention unless you are doing your own. Spending some of your money, however, in a way which he cannot help see will inure to his benefit is the best sort of a guarantee of good faith.

"When we come to consider the inculcation of habits of caution as a means of accident prevention we reach the most difficult and, at the same time, the most important part of the problem. Any accident prevention campaign must fail largely in its purpose unless the co-operation of the workmen themselves is secured. As a great safety leader said recently 'Safety men are more important than safety things.'

"One of the most efficient means of getting employees interested in 'safety first' is to have the employee serve on a safety committee which will go over the plan and equipment once a week and look for dangerous conditions and the means of guarding them, seeing if the safeguards provided are being used, and observing if

the workmen are doing their work as safely as possible. This not only results in better safeguarding and working methods, for in many respects no one knows so well as the workmen themselves what is needed to prevent accidents, but it also greatly stimulates the interest of the men in safety work. The members of this committee can be changed from time to time so as to get the widest range of suggestions and to bring as many men as possible within this sphere of influence, and each man who has served on a committee is urged to consider himself an unofficial safety inspector ever afterwards, keeping up his active interest and making any suggestions that may occur to him.

"One of the greatest fields for productive safety work is among the workmen of the future, through systematic education. This education can well be given to apprentices, in the industrial schools, in the training departments of our great industrial establishments, in the vocational schools, in the manual training departments of our public schools and, to some extent, possibly in the ordinary school classes. If habits of caution are inculcated in our future workmen during the formative period of youth, when they are most inclined to be receptive, they will cling to them through life."

ADDRESS BY CHARLES C. PEIRCE

Charles C. Peirce, vice-president American Electric Railway Manufacturers' Association and manager railway department, General Electric Company, Boston, Mass., spoke first of the work of the Manufacturers' Association. He referred to the permanent office at 165 Broadway, New York, where electric railway men and manufacturers of electric railway apparatus and their agents are always assured of a hearty welcome; of the plans of the secretary and treasurer, Mr. McConnaughy, to supply the members of the association information in regard to openings for foreign trade through an arrangement made with the bureau of foreign and domestic commerce of the Department of Commerce, and of attendance by committees of the association at the National Foreign Trades Council at St. Louis and at the meeting of the Chamber of Commerce of the United States at Washington a short time ago. The results of the observations of the committees will be transmitted to members as soon as possible.

Mr. Peirce then referred to the status of the electric railway companies, which he said were carrying about all of the troubles they could stand, and to the influence on public opinion of the press. He quoted Dr. Hadley, of Yale University, that the power now possessed by the press carries with it a grave responsibility to the public, and said that it was the duty of the press to clear up any misunderstandings that may have arisen between the public and the transportation utility. He said that he had recently had an opportunity of reviewing the editorial comments from more than fifty newspapers of the United States upon the mid-year meeting at Washington. Much of these comments had to do with the address of President Wilson, and they were couched in various tones of commendation and criticism, but through them all ran a spirit of friendliness to the business interests of the country, which is encouraging to a degree. It was Mr. Peirce's belief that the American newspaper to-day had become America's greatest utility, and therefore, to paraphrase Grover Cleveland's celebrated remark, "The position of the editors of a newspaper is an absolute position of public trust."

THE MANAGEMENT AND PUBLIC RELATIONS.

In continuing Mr. Peirce said, in part: "During the last decade, which, in this country, has been one of marvelous growth, the individual ownerships of our utilities have passed over to corporations, and there has resulted an unfortunate attitude on the part of the public toward the street railways which has been caused sometimes by the unthinking acts of mistaken corporation officials, who gave the impression that corporations were not human; that they were organized under the laws mainly to evade personal responsibility, and that, having accepted the acts which give them the right of incorporation, they set themselves up as greater than the people from whom their power was derived.

"And we ofttimes hear it said that the attitude of a corporation is reflected in the acts of its officials. I have often felt that, given the opportunity of getting upon the rear platform of a car, I could, in nine cases out of ten, tell the peculiar characteristics of the management which handles that property. Being a new art, in many cases we have made the mistake of selecting weak men for managerial positions. It has been no uncommon thing in the early days to see properties which have cost hundreds of thousands of dollars being managed by directorates who thought they were wise in hiring men at very low salaries, thinking thereby to save money for the benefit of their enterprise. But a workman is always worthy of his hire, and you only get in this world for labor return exactly what you pay for, and low-priced men, generally speaking, are able to give only a low-priced return.

"In the evolution of all forms of corporations in the last decade, there has been a tendency to do away with the personality of the active agent in almost every instance. This is a reaction from the so-called one-man control, which has been unpopular from the belief that has crept into the minds of the American people that no one man should be allowed, under our democratic form of government, to exercise such abnormal control. Yet it seems to me that this works to destroy the strength of the corporation, as the successes of most of our great corporations have generally been made under the personal magnetic direction of a single mind.

"The tendency has been toward doing away with direct responsibility and going into committee management. But it is a well-known saying that divided responsibility is no responsibility. Committee management in many cases does not, and cannot, give anything except a compromise direction. Of course we know that in committee work, generally speaking, there is always a strong mind which dominates. If this is a fact, to get properties back to the most efficient basis, strong men should be placed at the helm, and if they are not strong enough to do the work they should be replaced and others appointed who are able and will produce the results aimed at.

"In corporation growth the personality of the active agent and the potentiality of personality have seemingly been lost sight of by the various authorities who pose as organizers, efficiency engineers and students of so-called 'system.' The very magnitude of our American corporations to-day requires positive personalities for efficient direction. In the street railway business especially, unlike the other utilities, our agents are in immediate contact with the community every hour of the day and night. How easy it is, therefore, for our agents to create a wrong impression for our company by some little act or statement."

THE PROBLEMS OF THE INDUSTRY

Mr. Peirce, in continuation, said that the ten years which ended in 1905 were the banner years for electric railway extension. Their power for good was recognized by the people and their promoters received every encouragement. Since that time the situation had changed materially, and more and more restrictions have been thrown around electric railway development,

with the consequence that there had been a slackening and in some communities an almost total cessation of electric railway extension. Those in the electric railway business believe that if the public knew, as the railway men know, that the profits are not exorbitant, and in fact hardly commensurate with the risks taken, there would be fewer such restrictions.

The nickel of the passenger has been divided into its component parts according to the uses to which it is put, and it has been shown that 1.68 cents goes into wages of employees; 0.97 cent for supplies; 0.74 cent for interest; 0.56 cent for rent; 0.23 cent for taxes; 0.21 cent for claims of damages; 0.16 cent for reserve funds; 0.14 cent for salaries, and 0.31 cent to the stockholder.

The interest of the supply man in electric railways is very marked, as it is the nickel of the passenger that enables electric railways to live, and it is the nickel of the passenger that enables the electric railways to buy supplies. When the flow of these nickels into the pockets of electric railway companies ceases, or is diminished, the life-blood of the manufacturer of railway supplies is vitiated. Hence, the manufacturers should help the railways, and by so doing they are helping not only the interests of the railways, but their own interest.

In the American Electric Railway Association there is a splendidly equipped and most potential means of securing the object which the railway men and the manufacturers seek. Through its committees and publications and numerous other channels, it is battling, and with some degree of success, for the rehabilitation of conditions as they have existed. It deserves the support of every railway man and of every manufacturer and of every representative of a manufacturer.

In conclusion Mr. Peirce said, "I am sorry that there is no more intimate way in which it can be designated than by the somewhat coldly impersonal term of 'association,' since it is rather the railway man and the manufacturer who are fighting through the association than it is that the association in itself is performing the work. It is our organization, gentlemen. Its success is our success; its failure, if such a thing is conceivable, would be our failure. And I trust that I am not pre-empting the prerogatives of my fellows in the operating field when I urge upon you the duty, not of supporting its interests by your co-operation and enthusiasm, but of supporting your interests through this instrument which stands 'ready made' for your use."

ADDRESS OF MATTHEW C. BRUSH

In his address on Feb. 25 at the Central Electric Railway Association, M. C. Brush, second vice-president Boston Elevated Railway and president American Electric Railway Transportation & Traffic Association, explained that he had been requested by President Allen of the American Electric Railway Association to represent him at the meeting. He said he had been selected because one of the vice-presidents, Mr. Henry, was a member of the Central Electric Railway Association and Mr. Allen felt that it was unfair to call upon him for this reason, and the three other vice-presidents were unable to attend. Mr. Allen could not be at the meeting on account of an expected operation.

Mr. Brush complimented the Central Electric Railway Association on its membership and representative character. He then showed the growth of the electric railway industry during the past 33 years by giving some statistics for 1882, when the national association was organized, and at the present time. He then sketched briefly the work being undertaken by the American Electric Railway Association, mentioning particularly the committee on public relations, the committee on federal relations, the bureau of fare research, the joint committee on overhead and underground line construction, the committee on standard classification of accounts of the Accountants' Association, the committee on standards of the Engineering Association, the board of accident prevention and the association's monthly publication. He also referred to the mid-year convention at Washington, which he said was the most successful winter meeting the association had ever had, and commended the selection of Washington instead of New York. The speaker believed that the publicity which the association received in connection with this meeting would help the public to understand some of the problems of the railways. Continuing, he said: "The public as a whole is fair, but the great difficulty in the past has been that the public has not understood the real facts relating to the conduct of the transportation business, for which misunderstanding the companies themselves are in a measure at fault for not having earnestly endeavored to acquaint the public with the facts.

"Mr. Allen was very anxious that I endeavor to convey to you his thought that while corporations can be members of the associations, the corporations themselves cannot do anything in the line of work. The work of the association, like all their work, must be performed by individuals. Individual effort, or the efforts of three or four individuals, would produce a certain amount of work. The highest efficiency, therefore, in the association work is produced with a large group of individuals, and the larger the group the higher the standard of the association work. Mr. Allen believes that the association must tell the story of the electric railway industry to the world. One of the means is to tell those engaged in the industry what the story is, make them believe in it to such an extent that they will tell it to their neighbor, to the butcher, the baker, the barber, etc. He believes that the majority of electric railway employees today do not understand what the real story is and what the real troubles are. Associations like the Central Electric Railway Association, co-operating with the American Association, can be of great value to the industry in educating the men now depending on the industry for their bread and butter to the true story, and then having them go forward and tell it to the world."

In conclusion, Mr. Brush congratulated the companies in the Central States on the support they had given to the national association and on the services which representatives from that section had rendered to the national association. He then made a plea for continued support of the association from all present.

ANNUAL REPORT OF CHAIRMAN OF THE CENTRAL ELECTRIC TRAFFIC ASSOCIATION

BY A. L. NEEREAMER

During the year ended Dec. 31, 1914, your association has held eleven meetings, all of which have been well attended and as a result a great deal of good work has been accomplished. Of the membership of the Central Electric Traffic Association, forty-seven lines representing 3626 miles, participate in tariffs and other publications of our association. This is an increase of one line and 57 miles over the previous year. Joint and local baggage tariff No. 8, participated in by forty-three lines and cancelling joint and local baggage tariff No. 7, was issued Aug. 14, 1914. This is the second issue of this tariff during the year.

The interchangeable 1000-mile ticket is now participated in by thirty-one lines representing 2868 miles, as

shown by joint passenger tariff No. 13, issued Sept. 24, 1914, an increase of one line and 76 miles over the year preceding. This ticket appears to grow in popularity as 6000 tickets were ordered and placed in the hands of the agents during the year past, making in round numbers 28,000 tickets ordered since its inception, or an average of more than 4200 per annum.

The official classification is filed by the chairman for thirty-nine member lines, an increase of one over the year preceding. There has been only one issue of the official classification during the year, but that publication now has ten supplements, and from present indications it will be reissued about July 1, 1915, with quite a number of very important changes in its construction.

In September, joint passenger tariff No. 14, which is a reissue of joint passenger tariff No. 6, was placed in the hands of the member lines. This publication is participated in by thirty-seven of the member lines, and when the present supplement, which is now in the course of compilation, is completed, two additional lines will be added.

Joint freight tariff No. 10, participated in by thirty-eight lines, covering exceptions to official classification, is now about ready to be placed in the hands of our member companies. This tariff cancels joint freight tariff No. 8, which was issued March 31, 1914.

The committee having in charge the basis of uniform class rates has been working diligently on this subject, and the information collected by them will be of great value to us.

The official interurban map is now in the hands of the map makers, being revised, and when finished will be complete and up to date. An index of all cities and towns will be printed on the back, thereby making it of greater value to the traveling public. The committee having this in charge devoted considerable time to securing the necessary data.

In a paper read before the parent body at the meeting held in Toledo last June, your chairman referred to "intangible benefits" derived from the association by its members. The past year is one in which this has been more perceptible than any period during the life of the association.

The past year has been fraught with great activities as well as being one of progression and, notwithstanding the depressed financial condition, of success to the association. This success and the results achieved is due to the co-operation of the members and the valuable assistance given by members—individually and collectively—as well as the various committees (all of which have been active and energetic) to the chairman in the discharge of his duties. And for that support he now extends his heart-felt thanks. The display of the same spirit and loyal co-operation during the coming year will achieve greater and more valuable results, as well as extend the scope of the association.

Legal Aspects of Accidents

At a recent meeting of the Washington Railway & Electric Company section of the American Electric Railway Association, George P. Hoover, attorney for the company, presented the attorney's view of the accident question. He contrasted the old and the new conditions in regard to the attitude of the courts toward responsibility for accidents and explained how the work of the trial attorney can be lightened through co-operation.

Mr. Hoover quoted an early accident report as follows: "On ——— trip, north bound, at 4½ and Missouri Avenue, Chinaman jumped off car and fell; couldn't get his name; chased him two squares and couldn't catch him." Mr. Hoover said that accident reports in the early days were written principally upon the backs of transfers. People at that time had not become so enlightened upon the subject of suing for damages, lawyers were not so active in the prosecution of claims against railroads, and doctors had not become so proficient in the discovery of the various ailments which are now attributed very largely to accidents on railroads.

In the early days it was easy for the railroad to win accident cases because the courts held that if it appeared that the person injured had failed to look out for approaching cars, as a matter of law he was guilty of contributory negligence even if the employees of the company were negligent in the operation of the cars. Under such circumstances the courts did not undertake to measure the degree of negligence on the one hand or the other. During the past few years the courts have adopted what is commonly termed the "humanitarian doctrine" or the "doctrine of last chance." In simple language, this means that even though the man who sustains the injury has himself not exercised the degree of care which is imposed upon him by the law and by his own carelessness has placed himself in a position of peril, nevertheless, if the motorman of the car by the exercise of reasonable care could have seen him in a position of peril and then by the exercise of ordinary care could have stopped the car in time to avoid the accident, the company is liable to the man injured. The courts have practically nullified the doctrine of contributory negligence in this class of cases.

There is also a variation in the law itself and in the enunciations of the principles of the law which make it more difficult for railroad companies to win their cases in court and more important for the railway to prevent accidents, and in those which cannot be prevented to secure as many witnesses as possible, and to make observations as to its exact location. A company's attorneys, even after investigation of an accident by the claim department, sometimes have difficulty in determining the nature of the charge which is to be presented against the company upon the trial of the case. Hence any statement by the plaintiff made before the trial of how the accident occurred, or how he claims the accident occurred, is valuable. As the claimant may deny or correct this statement in court, other testimony should be secured.

Mr. Hoover showed that the operating department is primarily charged with the responsibility for keeping the road open and the public is primarily interested in being transported to their destinations, and not in helping to secure the names of witnesses. Further, the use of a curtain behind the motorman often makes it difficult for passengers to see an accident. But a systematic investigation by the company's representative frequently secures the names of people who have seen the accident, and this is the only means by which the company can defend itself against claims. The names of witnesses should be secured even if an accident appears trivial at the time, for a slightly injured person may later have an exaggerated idea of his injury and may decide to present a claim.

In conclusion the speaker instanced a number of classes of accidents which are very difficult to defend, particularly those due to persons crossing behind a car which is passing another at a high rate of speed, to the swinging of the rear end of double truck cars, to unsafe or improperly located platforms, to icy platforms and steps, etc. Finally he urged the managements of electric railways to impress upon employees the necessity for avoiding accidents and to commend them for prompt action when accidents occur.

Syndicated Anti-Railway News

An Account of How Some Daily Newspapers Get Their "News"—Anti-Railway Material Send Out as "Features" for Local Paper Reproduction

Those who are not acquainted with the methods followed by daily newspapers in securing the material which they print in their pages have little idea of the great variety of sources from which news comes. Many readers believe that practically all the matter printed in a daily paper, except that received from the associated or other news bureaus by wire and the advertisements, is originated in the editorial office of the daily paper. By inference they apply this same deduction to editorial articles, local news, cartoons, the joke columns, the book reviews, the society column and so on. This is as far from the facts as would be the conclusion of the man in the street that a railway company manufactured all of subject apropos of nothing. The answer may be that the newspaper is a subscriber to some national bureau which is sending out news or "feature" material of this particular kind at this particular time. The article, when received by the local daily paper, may be changed around somewhat to give it local color, but the idea and central thought are not that of the local editor at all. Very often the pictures used to illustrate the article are syndicated.

The local editor is protected as regards the "news" feature because he knows that the national bureau does not sell to more than one paper in a city, and to the local editor it makes very little difference if the same ma-

"Any City Can Profit in Jitney Bus Business!"

TRANSPORTATION EXPERT DECLARES MUNICIPAL JITNEY BUS LINES WILL SOLVE STREET CAR EVIL AND SHOW A PROFIT.

BY J. BRADLEY SMOLLEN

Staff Special.

CHICAGO, Feb. 0.—"When gigantic traction corporations, secure in the possession of cast iron franchises, abuse their privileges by furnishing inadequate service, then it is time for the municipality to step in and compete with them. And it can compete with them—and make money!"

That is the conviction of Alderman Eugene Block, chairman of the committee on local transportation of the Chicago city council, father of the movement to establish a system of city-owned "jitney buses."

Block has just proposed that the city set aside $300,000 to establish the nucleus of a city-wide series of five-cent auto buses and solve the traction problem that subway-less Chicago is continually compelled to bear.

He is very much a jitney bus fan where municipal ownership of the vehicles is concerned; and just as pronounced in his opposition to the privately owned cars. He's out to create better public service conditions and will accept no half measures.

He proved his sincerity the other day. A sample jitney bus rolled up to the city hall and aldermen and other city employes were invited to take a test ride. Block, naturally by virtue of his position was the recipient of a special request.



Eugene Block

JITNEYS ROUT NEW ORLEANS TROLLEYS; BRING 3-CENT FARE TO THOUSANDS OF SCHOOL CHILDREN.

Special Correspondence.

NEW ORLEANS, La., Feb. 00.—"All aboard! No strap-hanging!" cries Dan Feitel, head of the New Orleans Jitney-mobile company, just established.

"Plenty of seats now," echoes the car company.

"Three cent fare for school children!" retorts the "jitney" man.

The railway company hasn't yet answered the three-cent cry of the "jitneys."

The jitneys have gone the railway's company one better, but the betting for Mr. and Mrs. Public's patronage still is on!

In the meantime, with competition keen, thousands are riding to and from work in jitneys de luxe and others are "joy-riding" about New Orleans in them.

For months past the city, led by Mayor Martin Behrman, has been hot and fast after the railway company to get more cars and better schedules, hoping against hope to afford some relief for the countless straphangers.

Promises galore were made by the company.

But, were they carried out?

Not until the "jitneys" came along!

Now, however, in desperation the car company is trying to get back the straphangers' patronage, grabbed by the "jitneys." Great, big cars are being hurriedly placed in operation—the type

SYNDICATED ANTI-RAILWAY "NEWS"—TWO "SPECIALS" DIRECTED TO EDITORS BOOMING THE JITNEY BUS

its cars, trucks, motors, over-head equipment and power station equipment in its own shops.

Practically no newspaper could afford the force to prepare in its own office all of the material which appears in its columns, and the smaller the city, the more the daily paper has to depend on outside sources for its material. The result is that there is a large number of bureaus of national scope which supply all classes of information to daily papers, syndicating it so that the cost of the service for each paper is comparatively small. These services include practically anything that an editor may think a considerable number of his readers might want, that is to say, society news, sporting news, literary news, comic pictures, political gossip, travelogues and even "plate material," which is matter already stereotyped so that the local editor does not even have to set it.

This explanation may be of help to a reader in explaining why his local daily paper may take up a certain erial does appear at the same time in other papers in other cities.

Anti-Electric Railway Campaign

The Electric Railway Journal has had drawn to its attention some syndicated material of this kind which has recently been sent out to daily papers by a newspaper publicity bureau, together with the "mats," or matrices, required for the illustrations. Three of these are reproduced herewith. The interest to electric railway companies lies, of course, in the fact that this particular bureau, having exhausted other subjects which it thinks of live interest, is suggesting an attack on local railway companies as a means of "winning new readers." The note to the editors on the reproduction on page 463 is particularly significant. The rank injustice inflicted on the local company or the immorality of attacking a legitimate business enterprise without cause does not seem to have occurred to the news bureau. This month it is

the railway company. Next month it may be some other interest or enterprise. And during the excitement produced by the jitney bus movement, it is possible that other concerns of this kind will utilize all sorts of muckraking material on this subject. How little regard may be shown for facts is fairly well indicated by the article headed "Any City Can Profit in the Jitney Bus Business."

To just what extent this material has been published by daily papers in this country the ELECTRIC RAILWAY JOURNAL is unable to say. The bureau in question is



Straphangers Start War on Rotten Car Service---Demand Seats, Clean Air and Warm Cars.

SECOND CITY JOINS NATION'S FIGHT ON HOGGING CORPORATIONS; PEOPLE OUT TO CLEAN UP EVILS OF STRAPHANGING, IRREGULAR SERVICE, COLD CARS AND CONDUCTORS WHO "BUST YOU ON THE JAW."

NOTE TO EDITORS:

Why not get your own straphangers started on this better car service thing? One Chicago paper is getting fine action with its campaign and certainly winning new readers. Just give your people a chance to write you letters kicking on the car service in your town and they'll find plenty of things to kick about. You can condense their letters and carry the main complaint in a sentence or two. N. E. A.

CHICAGO'S SARDINE SYSTEM.

Staff Correspondence.

CHICAGO, Ill., Jan 00.—The man is standing on the corner He is waiting for a car Poor boob. One whizzes past. Then another. The citizen begins to get exasperated. His feet are cold and his head hot.

Fifteen minutes later another car comes dashing along In desperation the would-be passenger stands in the middle of the track and determinedly holds his ground The speeding car stops with a jolt two yards away The man runs around to the rear, but the car, with a "tag, your it" abandon, starts off quickly and the citizen's over-anxiety to part with 5 cents costs him a fall in the snow.

But here come more cars—lots of them Over the same spot where only three cars passed in half an hour a dozen now pass in half a minute. The irritated citizen boards the first one, crowded to the guards, and clings on the back step.

The conductor, a big burly fellow, is threatening a passenger with a "bust in the jaw" when the car comes to a sudden stop The one ahead has hit a woman and a crowd has gathered

"Look out for the 'gray ghost.' Call the police," admonishes a passenger who has seen the traction company's famous—no, infamous—claim department in action.

But hardly does he speak the words before a speeding cloud-colored auto ambulance comes around the corner. The unconscious woman is loaded in and carried off to a hospital, her whereabouts to be unknown to relatives or friends until she has been bullied into accepting a small cash amount for her injuries and relinquishing all rights to sue the corporation.

That is what the traction companies of Chicago are inflicting on the public and trying to make the public like it, according to the complaints filed by disgusted straphangers.

The fact remains that Chicago, the second city of the United States, is having the kind of trouble with its street car service that would not be tolerated in any other city of the world!

Cars run irregularly and alm-ssaly They do not even maintain the same routine entering the loop. One cannot tell where a car is going to take him half of the time. It is either that or being ordered off half way downtown with the words, "Far as we go"

Ventilation is rotten, most cars are cold and frequently 150 persons are crowded into a trolley that seats 40, according to reports on file in the health department.

Only a few days ago a woman was pushed off a crowded back platform and, being rushed to a hospital, gave birth to her child—prematurely, the physicians said. Persons residing in the outskirts suffer the most. Cars run infrequently and then usually only part way, necessitating a long wait at some cold transfer corner

Woe to the citizen who tries to catch the "owl car." He usually ups up from $2.50 to $5 for a taxi ride home. Taxi drivers follow the last cars on various lines and the motormen obligingly pass up the belated citizens, it is said. One taxi driver admitted he picked up fifteen fares in one night in this manner.

Chicago street car employes have won a reputation for their roughness and insolence. This could not result unless as a reflection of the company's system—that of obtaining rough and insolent help. It is notable that no small men ever get such jobs. They are all big, husky fellows.

Now Chicago is disgusted with its car service And it takes some thing to get a Chicago strap-hanger disgusted But the nation-wide fight on hogging public service corporations has reached this city and the citizens promise a day of reckoning for the street car company

CHICAGO, JAN. 4.

SYNDICATED ANTI-RAILWAY "NEWS"—CIRCULAR IN WHICH EDITORS ARE URGED TO START A CAMPAIGN AGAINST "ROTTEN CAR SERVICE"

said to issue from five to eight pages of newspaper material with illustrations in mat form every day from its central office, as well as additional material from two other offices which it has in other parts of the country. If the usual course is followed, the matter prepared by this syndicate will be offered to every newspaper in the country that is a possible purchaser. This matter carries in one of its headlines the declaration that straphangers are starting a war on "rotten car service." No particular city's car service could have been in mind when this head was written. It is merely a cheaply multiplied and broad-coated libel offered at a trifling sum per column in the hope that some editor too feeble minded to think for himself will use the copy. The case would be much the same if a newspaper syndicate offered a story headed "Mothers Start War on Clerical Child Poisoners."

The attempt to capitalize in the cheapest form a preconceived animosity toward city transportation companies might easily have been the text for another paragraph in President Hadley's article in the February *North American Review* under the title "The Organization of Public Opinion." As it is, the following sentences, should they come to the eye of the railway baiting syndicate or of newspaper editors, will not seem ungermane to the subject here discussed:

"A man who desires to make his newspaper popular is under a constant temptation to cater to the prejudices of his public. Without actually making grave mis-statements he can print the facts which they like in large type and suppress or relegate to the obscure columns the facts which they do not like. Under these circumstances their judgment is distorted and their preconceived opinions confirmed, until they become incapable of weighing the real evidence on which their political action ought to be based. If another paper tries to furnish them with the true facts, they do not believe it. They are accessible only to the kind of evidence that their particular journal prefers to furnish."

The Red Book

The McGraw Publishing Company, Inc., will not hereafter issue the McGraw Electric Railway Manual, commonly called "The Red Book." When publication of this manual was begun in 1894, very few electric railway companies published annual reports, and there was no place where the financial statistics of these companies could be obtained except for the roads of about six states in which the reports of railroad commissions were published.

This condition has now changed. A sense of the importance of making such statistics available has led most companies to issue annual reports in a form available to the investor. Elaborate statistics also are published by regulatory commissions in nearly every state. Again, at least three financial manuals devoted originally to steam railroad securities now include statistics of electric railway companies. A further publication of the Red Book would therefore seem largely to duplicate the reports being made by the electric railway companies and others.

Consular Recommendations on South American Trade

That the United States has in the last few years been making steady advances in the markets of the various South American countries is plainly brought out in a publication just issued by the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, entitled "Consular Recommendations in South American Trade." Consular recommendations are well summarized in a report from Rosario, Argentina, which states that the principal factors in extending American trade may be included under five heads: Investment of American capital, steamship facilities, credits, direct personal effort, and willingness on the part of American manufacturers to comply with local requirements. The first two of these points have been thoroughly discussed in the press and in official publications, and steps have been and are being taken to provide the missing facilities.

Twentieth Quarterly Meeting of N. Y. E. R. A.

At the Lake George Meeting, Held March 2 and 3, the Main Topics Discussed Were Maintenance and Fare Collection

The twentieth quarterly meeting of the New York Electric Railway Association was held at the Fort William Henry Hotel, Lake George, on March 2 and 3, with President James F. Hamilton, Schenectady, in the chair. The meeting opened with a banquet on Tuesday evening, attended by 104 persons, and the formal proceedings were confined to a 3½-hour session held on Wednesday morning. The latter was preceded by a meeting of the executive committee.

The Banquet

The banquet toast list was prepared with a view to giving the railway men the point of view of the outsider as far as possible. In introducing the speakers Mr. Hamilton compared the association to a school which comprises both teachers and students. Several speakers took a cue from this and made reference to education in its relation to railway work.

James O. Carr, counsel for the General Electric Company, explained the relation of the lawyer to the public service corporation, which includes, he thinks, the function of helping his employer to comply with the law and not to evade it. J. Teller Schoolcraft, mayor of Schenectady, told a string of stories designed to show the pleasant relation existing between the officials of that city and the railway. He concluded with a poem "Making Your Dreams Come True," which expressed the relation of the track worker to the railway official from the former's standpoint. C. S. Sims, vice-president and general manager D. & H. Railroad, emphasized the unsatisfactory financial condition of electric railway properties and urged the companies to work primarily to secure fare rate increase. N. I. Schemerhorn, a merchant of Schenectady; Rev. C. B. McGill, a Presbyterian clergyman of the same city; Harlow C. Clark, representing the American Electric Railway Association, and Elmer J. West, president of the Chamber of Commerce of Glens Falls, also spoke. Mr. McGill gave a condensed history of invention in this country and its relation to electric railway development and Mr. Clark showed briefly the identity of the railway men present and the national association. Mr. West, who is also vice-president of the Adirondack Electric Power Corporation, spoke from the standpoint of a civic body which has taken a reasonable attitude in the recent agitation against the D. & H. Railroad. He said that the corporation needs friends in these days but the corporation is not free from blame for the present condition.

Wednesday's Session

The main session of the meeting was devoted to three topics: "What the New York Electric Railway Association Can Do For Me," "Collection and Registration of City and Interurban Fares," and "What Constitutes Good and Sufficient Maintenance?"

In opening the discussion on the first topic Mr. Hamilton outlined the manner in which the program had been prepared. As the association is made up of individuals, each must take advantage of the opportunities which it affords. There followed what might be termed an "experience meeting," opened by C. J. Witherwax, passenger agent Schenectady Railway Company. He defined the purpose of the association, which is to discuss topics of every-day practical use. The educational function is prominent, and even if a particular discussion is not exactly along the line of one's everyday work it is important in promoting interdepartmental sympathy. The association can help in developing a higher grade of ability necessary to success. W. H. Hyland, claim agent Fonda, Johnstown & Gloversville Railroad, thought that the banquet benefits him most, as the speeches reflect the experience of important men. The "personality" of the meetings, that indefinable something which results in "liking the fellows" is also important.

C. H. Smith, assistant general manager United Traction Company, Albany, took another "tack" in urging that railway income must be increased and that the association should secure legislation permitting charging for transfers. Coming back to the course previously marked out, B. Penoyer, engineer maintenance of way, and C. J. MacAleer, claim agent, Schenectady Railway, and C. F. Hewitt, general manager United Traction Company, reinforced the claims of earlier speakers regarding the value of the meetings.

Harlow C. Clark, New York, started the meeting off on another "tack" by using the jitney bus situation to illustrate the lines of cleavage of national and state association work. Mr. Hewitt followed with the statement that these bus lines must be kept within the jurisdiction of the public service commissions. J. E. Hewes, general manager Albany Southern Railroad, gave fresh information showing the injustice of the present terms of competition, illustrating by a case in which a bus line has an exclusive franchise to use a state highway under practically no restrictions. He believes that buses on state highways should obey crossing laws. He urged the association to secure legislation to that effect and also to make failure to register fares, on a conductor's part, prima facie evidence of theft. He gave amusing instances of how railway property is valued for taxation purposes and said that the railways should exert a regulating influence on commissions.

George A. Lewis, Auburn local manager Auburn & Syracuse Electric Railroad, noted a tendency of the commissions to make concessions and urged the railways to stand firm in their reasonable requests. William M. Lawyer, Whitmore Manufacturing Company, Cleveland, Ohio, stated that the larger salaries and more secure tenure of office of Canadian commissions produce more satisfactory results than our system.

J. P. Barnes, general manager Buffalo, Lockport & Rochester Railway, spoke for association publicity. Charging for transfers is but scratching the surface. To convince the public of the good faith of the railways the full message with reasons must be given. Referring to the appropriate clause in the first article of the association's constitution he recommended the establishment of a permanent secretarial office for the supply of ammunition with which to fight false statements. F. E. Belleville, auditor Schenectady Railway, gave statistics showing that out of $370,000 of net income of his company last year $100,000 went into taxes of one kind or another. H. C. Prather, Syracuse local manager Rochester, Syracuse & Eastern Railroad, then read a resolution embodying Mr. Barnes' suggestion of a permanent association office, which was referred to the executive committee with power, the sentiment favoring such action if practicable.

Following the above discussion James E. Hewes, general manager Albany Southern Railroad, read the paper on "Collection and Registration of City and Interurban Fares," abstracted elsewhere. He explained extemporaneously the plans used and to be used on his road and incidentally mentioned that the cost of producing transportation is 9 mills per passenger mile and that, by increasing rates considerably last year, the gross income was increased with 110,000 fewer passengers carried. In the discussion C. H. Smith said that, in his opinion, the best system for collecting city fares is the pay-enter plan with cash-box and register. Inspectors should check up conductors frequently. Mr. Hewes agreed with this. C. F. Hewitt pointed out the difference between city and interurban fare collection and that railway men differ as to the necessity for auxiliary registers. W. S. Hamilton, superintendent Schenectady Railway, expressed his belief in the use of available methods, the financial condition of many properties not being such as to permit of the rental or purchase of registering devices. In Schenectady cars are equipped with counting fare-boxes, revenue and non-revenue registers, and pay-enter conductors are required to balance fare-boxes and registers on each half trip, recording balances on the daily reports. These are checked frequently and immediate explanations of discrepancies are called for. All cash and revenue tickets are registered on the "cash" register. A poor system rigidly enforced is superior to a good system more loosely conducted. All cash and revenue fares should be deposited by the passengers.

J. P. Barnes took up the subject of conductor honesty, dividing men into three classes: (1) Those normally and naturally honest; (2) those who will study out ways to "beat" any system, and (3) those whose honesty is dictated by circumstances. With honest conductors registration of fares is simply a counting mechanism for supplying data for changes in service, etc. Devices should protect honest men and encourage the third class to be honest. The system also should produce legal evidence of theft, not necessarily for use in prosecuting cases, but for the moral effect.

In reply to the question as to what evidence will be satisfactory in court, James McPhillips, attorney Hudson Valley Railway, replied that he did not know any way by which such evidence can be produced by a system of fare collection. These systems are thwarted in their real purpose by dishonest conductors. He thought that most conductors are honest and did not believe in having much patience with dishonest ones. He did not believe that a law would be effective in making failure to register fare prima facie evidence of theft.

F. E. Belleville, Schenectady Railway, stated that the "tear-off duplex" system is in operation on the lines of this company and that the use of the register has been discontinued. The ticket serves as a receipt and an identification check. Conductors at the end of each trip collect the "squares" in the passengers' hands and turn them over to the auditor. At the end of each trip conductors are required to note on their trip sheets the opening and closing numbers of the duplexes torn, together with their denominations. These are checked against the station master's report.

V. L. Edmunds, Railway Audit & Inspection Company, Philadelphia, Pa., stated that discharging men for dishonesty has little effect as it is apt to be taken as a joke. He instanced a motion-picture film in which the hero was "Rob Nickels." Preaching rather than law must be resorted to, as the preachers formerly got results with "eternal damnation." H. W. Peck, general manager Schenectady Illuminating Company, thought that reward would be better than penalty, say the use of a bonus for good work, but C. F. Hewitt replied that "virtue would have to be its own reward." J. P. Ripley, J. G. White Management Corporation, said that the bonus had been tried without success. L. A. Hall, purchasing agent Fonda, Johnstown & Gloversville Railroad, thought that a dishonest conductor can beat any register especially with a totalizer on it, while Elmore De Witt, Pennsylvania Steel Company, ventured the suggestion that it may be considered a bright thing to beat a register.

In closing Mr. Hewes expressed general agreement with previous speakers, but said that an occasional change of system is good if for nothing more than the moral effect.

WHAT IS GOOD MAINTENANCE?

The last feature of the meeting was the reading by Mr. Barnes of his paper abstracted elsewhere in this issue and the discussion briefly summarized below.

B. Penoyer, engineer maintenance of way Schenectady Railway, said that as far as the track is concerned it must be kept well aligned and the joints must be promptly and well repaired, all welds being ground smooth. Especially in paving is the removal of small evidences of wear necessary. Sometimes entire paving is ordered replaced when repair of only part was required. C. H. Smith, United Traction Company, agreed with this, urging incessant inspection and prompt repair, the latter carefully supervised. Insufficient track maintenance means high operating cost; accidents, derailments and wear and tear of rolling stock, etc. Good and sufficient maintenance also means "safety first."

J. P. Ripley followed with the statement that Mr. Barnes is really arguing for economical maintenance. The real question is how much money the directors will grant for maintenance, no matter how desirable and profitable the latter may be. Mr. Hewitt agreed with this, but encouraged the engineers to keep up their good work, stating that if their recommendations could be carried out property would be improved and returns would be better.

F. A. Bagg, chief engineer Fonda, Johnstown & Gloversville Railroad, instanced improved bonding as an element in maintenance and said that the word "Best" should replace "Good" in the title of the paper under discussion. Physical perfection in maintenance is rarely justified for operation and maintenance are interlinked. H. L. Barber, general manager Plattsburgh Traction Company, discussed waterproofing around track structure and showed that sometimes municipal specifications for paving do not take the railway's requirements into consideration. He wondered if the association could do anything to improve this condition.

J. E. Hewes, Albany Southern Railroad, pointed out certain inconsistencies in the public service commission's requirements regarding maintenance due to lack of experience on the part of commissioners. He thought that commissions should include, each, a financier and a railway manager. Replying to this and the remarks of other speakers, James McPhillips, Hudson Valley Railway, summed up as follows: Railway directors will always give favorable consideration to clear and definite recommendations. Railways should not tolerate illogical rulings of commissions. These matters should not be regulated by laws, already too numerous. City councils will usually give consideration to explanation of what type of railway construction is best suited to local conditions.

F. S. Doyle, master mechanic Schenectady Railway, gave the mechanical man's point of view regarding maintenance. Equipment should have daily inspection duly recorded. Inspection on a mileage basis should also be enforced and light repairs should be made promptly. An-

nual inspection should be more complete. The record of car failures is a good indication of the efficiency of the mechanical department.

President Hamilton then closed the meeting after a resolution of sympathy to Mrs. J. H. Pardee on account of Past-President Pardee's critical illness had been passed and ordered sent by telegraph.

COLLECTION AND REGISTRATION OF CITY AND INTERURBAN FARES

BY JAMES E. HEWES, GENERAL MANAGER ALBANY SOUTHERN RAILROAD COMPANY

Years ago the cash drawer of the retail and wholesale traders was replaced by the cash register, and to-day even the bootblack, with his one assistant, must have a cash register. The financial outlay represented by this cash register is as nothing when compared to the results accomplished by the new mechanical bookkeeper.

The value of the public indication has made the cash register indispensable in all lines of business activity, including the railway business.

Publicity is the safeguard against dishonesty, and therefore the more publicity we have the better. Money is the greatest tempter. Dishonesty is a recognized factor in railway operation. We do not doubt that our men are honest, they would not be in our employ if we knew them to be otherwise, but a check is necessary to make dishonesty as nearly impossible as we can.

There are many so-called cash fare-registers in use throughout the country to-day, but some are not adequate. To my mind the essential feature of a car register is that it be capable of recording each fare registered under its separate classification. The principle of registering a five-cent cash passenger and a three-cent cash passenger simply as two passengers is wrong, and is one to be discouraged because of the opportunity it gives the conductor to "knock down" two cents on each five-cent fare registered, aside from the fact that it is not good business.

A fare registering system to be successful must be one that is fair to the conductors' interests as well as to the company's interests. If your conductor is collecting five different denominations of fares and is registering three of these of widely different value upon one counter, what means has your conductor to show you that he has turned over all of the various fares as were paid by the passengers? If you provide means for a separate registration and indication for each of these five different denominations of fares the conductor is collecting, he knows that he has indicated to his passengers the receipt of their fares, and the permanent register record shows that he has registered them as paid. This same register record shows you that you are getting all of the fares paid by the passengers.

So much for the man who cares, but what about the man who does not care, the man who believes he is entitled to more of the company's money than is paid him in wages? How does the former system affect him? You virtually say to him: "Here is a machine upon which to register your fares; for every fare you register upon it you must turn in a fare"; thus leaving it to him to say how many of the various kinds of fares he has collected. If it suits his convenience to turn in a lesser number of 5-cent fares than were collected and to turn in a correspondingly larger number of school tickets than were received, making up the excess of school tickets from a stock previously purchased by his friends, how can you know of this substitution, as he has turned in a fare for every fare the register calls for? His chances to substitute school and regular tickets for 5-cent fares enable him to pilfer an enormous amount of money within a short time.

Now, a fare-register providing a separate counter for the school tickets, for the 4 1/6-cent tickets and for the 5-cent cash fares would prevent this substitution. When the conductor registers a fare he should indicate to the passenger its value by registering the same, and once the fare is recorded it should remain an untamperable record, compelling the conductor to turn in fare for fare as received.

In like manner there should be a separate registration and classification for each pass, special ticket, commutation ticket, etc. There is danger in the register which permits a change of the indication on the register after the fare has been recorded. Thus, on such machines it is the practice of disloyal conductors to register one value and to indicate another, that is, a man may register a 5-cent fare and then quickly indicate 50 cents on the register.

It is the aim of most interurban railway companies to require passengers to secure tickets at all agency stations before entering the cars. In some cases arbitrary measures are taken to attain this end; in others it is sought by indirect means, such as by levying an extra charge upon those who neglect to buy tickets, a receipt being given the passenger whereby he can have this extra charge rebated upon presentation of the receipt at a ticket office. With the car register, such a transaction is handled by the conductor registering the actual value of the ride, and collecting, say, ten cents in excess of the fare, for which he issues a ten-cent redeemable excess receipt. If the conductor starts with one hundred excess checks, at the end of the day he must account for these one hundred receipts or their cash equivalent over and above the amount which is shown on his register record.

The necessary thing in connection with handling tickets is the immediate cancellation of tickets and prompt transmission of such tickets to the auditing department. Until canceled, a ticket is in some respects like a bank bill; the general demand for it gives it a value. Consequently some men are tempted, and, through collusion, some take advantage of this circumstance to resell or replace on the market tickets that should be canceled and destroyed.

There are two ways to prevent the manipulation of tickets, which on interurban properties is a serious problem; first to place time limitations on them, and, second, to register the tickets as collected at their actual cash value.

Furthermore, the classified register record should be hidden from the conductor. With the record locked within the register, he has no means of knowing what this record calls for, consequently he must turn in all his collections. He counts his change before starting to work, deducts this amount when he quits, and turns in all of his day's collections. Now he is turning in upon the basis of what has been collected and not what has been registered.

By means of this closed record of registration we have a basis for figuring the personal efficiency of the conductor and therefore we can grade our men accordingly. At the present time, when so much stress is laid upon the human factor and the efficiency of our employees, this grading of our men according to their merit is very important. With such information the operating official is placed in most intimate touch with the work of his conductors that he cannot see.

So far as human ingenuity can provide for the performance of a duty, there is a moral force behind the system that compels some registration—the proper registration for each fare collected. The several indicators make the registration compulsory, for the reason that the conductor does not know but that the very passenger from whom he has received a fare is on the car for the

purpose of watching him. If that particular passenger is not doing so, some other may be, and this fact requires him to be careful and honest. It raises his standard of efficiency, gives him a better opinion of himself and makes him a more competent, all-around employee, capable in time of filling a position "higher up."

As a summation, we know that any system which makes a bookkeeper out of the conductor is, at best, inaccurate, and, furthermore, inaccuracy breeds carelessness, and carelessness breeds inefficiency, and inefficiency makes dissatisfied patrons. Inaccuracy, carelessness, inefficiency, dissatisfied patrons; these spell "loss."

WHAT CONSTITUTES GOOD AND SUFFICIENT MAINTENANCE?

BY JAMES P. BARNES, GENERAL MANAGER BUFFALO, LOCKPORT & ROCHESTER RAILWAY COMPANY

Opinions differ widely as to the degree of maintenance which could be defined as good and sufficient on various properties, but it may be defined broadly as that which keeps a property in such condition as to permit and facilitate good and efficient operation.

As maintenance expense is a part of operating expense, maintenance and operation are closely interlinked, and maintenance must always be considered in the light of the operating conditions and problems of the individual property.

If current maintenance is as thorough as possible, the depreciation charges will be relatively small, while if the current maintenance is kept to as low an expenditure as possible the deterioration of the property will be more rapid and consequently the depreciation charge should be correspondingly increased. This fact will tend toward a constant expenditure on maintenance; with the special divisions as between current maintenance and depreciation — which may be described as deferred maintenance—varying in respect to each other in accordance with the manner in which the current maintenance is handled.

There are two matters in connection with current maintenance which seem of prime importance:

(1) Maintenance of such degree as positively to insure safety, reliability and convenience of operation.

(2) Maintenance of such degree as to insure, so far as possible of determination, a minimum depreciation charge.

Considering the first requisite, it is obviously essential for any property that it be maintained to such a degree as to insure safety and reliability of operation, no matter what its earnings or conditions of operation may be. This is the first duty the transportation corporation owes the traveling public, and it will not be disputed. The fulfillment of this condition requires that roadbed, pavement, line, power house, and car equipment shall be maintained to a standard sufficient to fulfill the conditions of safety and convenience. For example, track must be maintained in such condition as to permit operation at schedule speeds without danger of derailment, not only on account of the physical dangers involved, but equally for the reason that the results of derailments are deranged schedules, dissatisfied patrons and all the ills resultant from adverse public opinion.

Continuing the reference to track structures, an excessive number of low joints and the consequent noisy operation may bring about the same results, so far as adverse public opinion is concerned, but the revenues of the company may be insufficient to allow for the complete elimination of this particular source of difficulty and at the same time allow for the proper standard of safety in maintenance of other structures and equipment. Under these conditions it would certainly not be wise to repair the low joints if the expense of that repair necessitated the departure from standards of safety in the maintenance of other structures and equipment, and, therefore, it would seem that this poor condition of track might be, for the property so situated, properly classified as good and sufficient maintenance.

The question now arises as to whether the property, situated as we have supposed in the above instance, should make any charge to depreciation, or deferred maintenance. If the depreciation is considered in the light of a periodical increment, based upon the cost of eventual replacement, the charges may be spread out over a long period of time and be individually small, or may be grouped within a small period and be individually large.

The second method may be considered as drawing upon the future for present needs, as the amount which would otherwise be charged to depreciation would thus be made available for current maintenance.

Numerous instances might be cited where the earnings of a property are not more than sufficient to pay its operating expenses, taxes and fixed charges. Whether an allowance for depreciation should be included in the operating expense of such a property is a question for consideration.

Considering the second requisite, where the earnings of the property are sufficient properly to care for its maintenance, it would seem obvious that the standards of maintenance should be such that the physical condition of structures and equipment will be at all times the best possible, resulting in the longest possible life and the greatest convenience and reliability of operation.

Experience has taught all of us that equipment which is kept up—well lubricated, bearings renewed when they should be, bolts kept tight, small defects remedied before attaining large proportions, etc.—will actually have a longer useful life than equipment which is not so carefully and completely maintained. This standard of maintenance would result in a small depreciation charge. This may be carried to the extreme.

To be good and sufficient, maintenance must be economical. In this connection, economical is taken to mean that money expended on maintenance is expended only where actual, positive and beneficial results are to be obtained. Maintenance must be planned ahead so that relatively heavy jobs may be undertaken and accomplished at times when the operating requirements of the property are light.

Joint Committee on Line Construction

The fifth meeting of the national joint committee on overhead and underground line construction was held in New York on Feb. 24. The committee devoted practically all day to a continuation of the revision of the present power wire crossing specifications, and divided the work up into sections to be apportioned to various sub-committees for revision. The committee expresses a desire for suggestions as to desirable requirements, and also detailed criticism of any of the clauses of the present standard power wire crossing specifications. The next meeting is scheduled for March 31.

Although 1913 and 1914 were years of strikes and depression in Colorado, the new business department of the Arkansas Valley Railway, Light & Power Company, Pueblo, under the superintendency of E. F. Stone, made a record in securing new business. During this period the horse-power of connected motor load was increased from 14,956 to 18,485—a gain of 23.6 per cent. Gross receipts from this source during the same period increased 29 per cent.

COMMUNICATIONS

Rational Units for the Boiler Room

Interborough Rapid Transit Company
New York, Feb. 26, 1915.

To the Editors:

Your editorial support of the plan to rate boilers on a heating-surface basis is very much to the point. Present American practice in this regard is most illogical, and it is not surprising that confusion results from a system of nomenclature under which 3000-sq. ft. boilers can have ratings that range between 250 hp and 350 hp and then are put into service wherein they are said to have outputs that range from 200 hp to 1000 hp. The unit, "boiler horsepower," has long since outlived its usefulness, and it may well be discarded. Obviously, the proper basis for the purchase of a boiler is area of heating surface.

There is, however, a point in connection with the matter which was mentioned only indirectly in your editorial of Feb. 20. This is that the boiler horsepower has come to be widely used not only as a basis for purchase but also as a unit of production, or output, for steam-generating apparatus. When it is applied in the latter sense there is somewhat more excuse for it than in the former, but still it has two serious objections: First, the fact that it is an absolutely arbitrary unit which can be converted only with difficulty into the common terms of heat production and power; and second, the fact that it is thoroughly misleading.

With regard to the first of these objections it may be said that the output of steam-generating apparatus can be directly expressed only in thermal units. In ninety-nine cases out of one hundred, however, the heat of the steam is eventually transformed into electrical energy. For this reason a unit of output which is easily convertible into electrical terms would be somewhat more convenient than the b.t.u., because a calculation for changing heat units into kilowatt-hours would have to be made anyway.

The boiler horsepower offers no such convenience. Its value expressed in b.t.u. is a complex number, difficult to remember, and its value in kilowatt-hours is equally unhandy in calculations. In fact, it is divisible by no common unit and its retention imposes entirely unnecessary labor upon engineers merely for the sake of an outworn precedent which even was established in error. In consequence, I have been for some time past strongly in favor of the use of the myriawatt, but if this cannot be generally accepted, some unit such as 100,000 b.t.u. is the only logical alternative.

The second objection, or the misleading character of the "boiler horsepower" as applied to output, also constitutes an important argument against it, and abolition of the term would, perhaps, serve to clarify some of the fundamental principles of boiler operation which have become decidedly obscured. Most important among these is the necessity for distinguishing clearly between the different functions of the furnace and the heating surface.

The furnace gives out heat—the heating surface absorbs it. The duties of the two are fundamentally different. Only the former is properly subject to a rating in terms of power, because the output of the heating surface (or that which is commonly called the boiler) is quite incapable of being definitely measured by a single expression. Little or no control can be exercised over heat absorption by the heating surface. Cleanliness is the only factor. On the other hand, flame conditions and excess air in the furnace may alter the efficiency 20 or 30 per cent, according to the character of stoker operation. Manifestly, the stoker or furnace is the controlling factor, and the heating surface is largely incidental to steam generation.

That apparatus of such indeterminate duty as this should be endowed with a definite output, at least by implication, because of the existence of the term "boiler horsepower" is a most unfortunate misapplication of names. No engineer would try to express the output of a condenser in horsepower without qualifying his statement by giving the vacuum and intake temperature. Why should it be considered any more reasonable to speak of the horsepower of heating surface? No heat-transfer apparatus, such as condensers, evaporators or feedwater heaters, can logically be rated in horsepower.

H. G. Stott, Superintendent of Motive Power.

Uniformity in Car Colors

Denver Tramway Company
Denver, Col., Feb. 23, 1915.

To the Editors:

I have read with interest the editorial in your issue of Feb. 6, on the question of car colors. Most of us are strong for uniformity and standards and accustomed to working out savings of even less amounts, but if a certain color is pleasing to the public, that fact no doubt has a value equal to several times the amount saved—should some other color be cheaper. Assuming the same durability in both cases, $5 per car is probably the full amount which can be saved by any change in color on a large city car. On a system which I have in mind, having a total of 386 cars, and possibly an average of 300 cars during a period of six years ending Dec. 31, 1914, 226 cars were repainted during this period. This is equivalent to thirty-seven a year, which, at $5 a piece, would mean a saving of only $185.

No doubt the steam railroads chose their present general standards on the basis of the colors on which coal dust and smoke would show the least and not particularly because the color in other ways was cheaper to maintain or that it would look better for a longer time. I doubt very much whether there is any great difference in the cost of maintaining the various tints or shades now in use, provided always that the best quality is used.

There is good reason for standards of color on steam roads, but with electric cars in city service I can hardly see any good reason for them, and in view of the strong efforts now being made by electric railway companies to "please the public," and the popular maxim that "it pays to advertise" it seems most important for a company to continue with the color which it considers is most cheerful and pleasing to the greater number of competent judges.

W. H. McAloney,
Superintendent Rolling Stock.

Chicago Elevated Club

The Elevated Club of the Elevated Railroads of Chicago held its fourth meeting on Thursday, Feb. 25, 1915. The principal part of the program was taken up by C. C. Farmer, of the Westinghouse Traction Brake Company, who gave an illustrated talk on air brakes. The difference between the old and the new methods of application of air brakes was described, and the marked advantage obtained by the latest equipment as installed on the new steel cars recently purchased by the company as compared with the old types was explained. Mr. Farmer described in detail the new air-brake equipment, as well as the construction and operation of the new Universal valve with its quick action feature which was also installed on the new all-steel cars. Although this club is only about three months old, its membership now approximates 130 and is growing rapidly.

Equipment and Its Maintenance

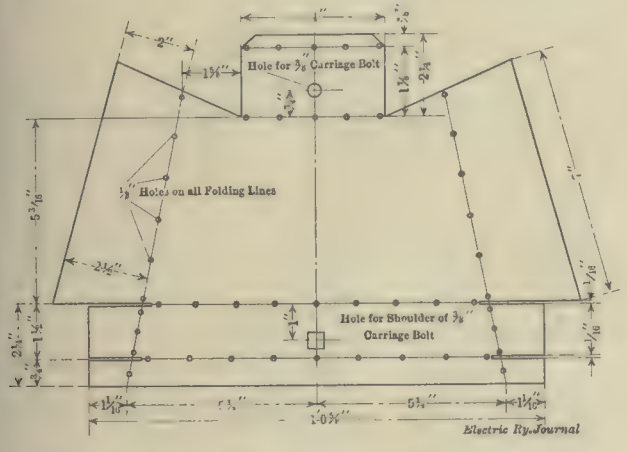
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

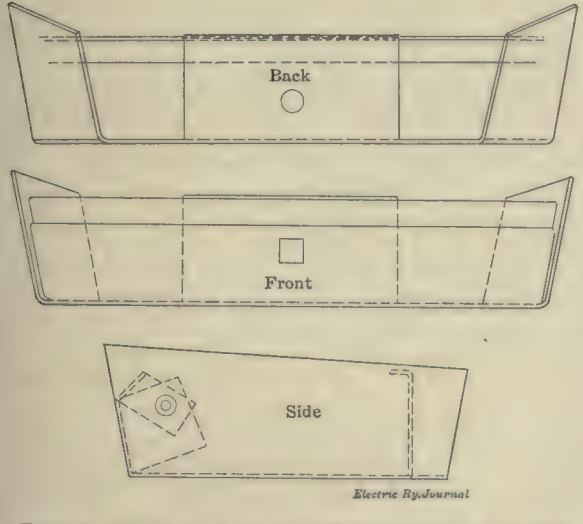
Removing Snow from Under-Running Third-Rail

BY F. L. HINMAN, MASTER MECHANIC NEW YORK STATE RAILWAYS—SYRACUSE AND ONEIDA LINES

Some trouble has been experienced during several winters past in the operation of the under-running third-rail system between Oneida and Syracuse (West Shore electrification) due to the drifting up of snow under the third rail in such quantities as to cause the collecting slipper to lose contact with the rail and seriously interfere with schedules. In order to overcome this trouble a sheet-steel snow slipper of the design illustrated was developed. This slipper is easily and quickly attached to the collecting shoe, and by its use the space under the third rail is kept free from snow.



PATTERN PLAN FOR THIRD-RAIL SNOW SLIPPER



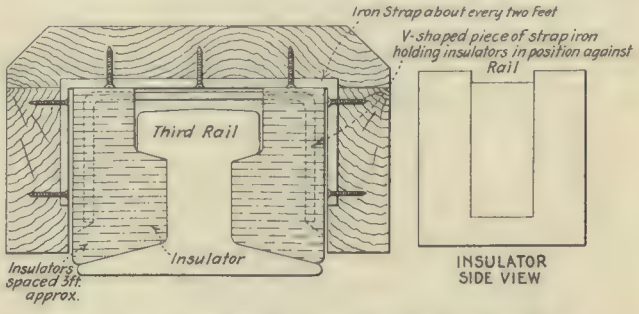
THREE VIEWS OF THE THIRD-RAIL SNOW SLIPPER

When this slipper was first tried out we found that the additional weight of the snow slipper was too great to be taken care of properly by the shoe springs then in use. However, the substitution of a stronger spring overcame this defect. During several trials made this past winter it was found that at speeds of from 25 to 40 m.p.h. this device is very effective, although it clears fairly well even at lower speeds.

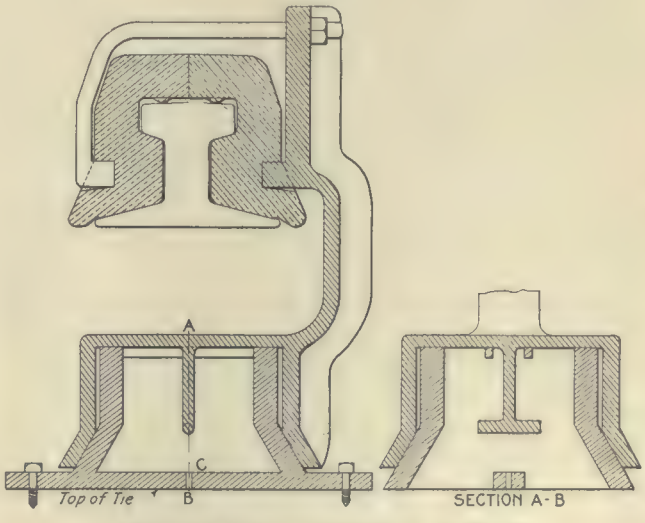
High-Voltage Third-Rail Construction

BY A. H. TRACY, ASSISTANT ELECTRICAL ENGINEER COMMITTEE OF INVESTIGATION ON SMOKE ABATEMENT, CHICAGO, ILL.

The accompanying drawings show a suggested type of third-rail support and protection suitable for high-voltage operation. The improvement in the support consists in so mounting the supporting bracket on a cup-shaped casting that the third-rail and its insulators are relieved of all strains due to the depression of the ties caused by passing trains. The third-rail is prevented from turning over by the T-shaped portion of the bracket base which is limited in its upward movement by the two cross webs at the top of the cup-shaped casting.



THIRD-RAIL PROTECTION BETWEEN SUPPORTS



HIGH-VOLTAGE THIRD-RAIL SUPPORT

To erect the third-rail a nail is driven into the tie at

the point c which has previously been located by a template. The cup is then centered by means of the nail and is revolved horizontally so that the T-shaped projection on the bracket will pass between the webs of the cup. When the bracket has been mounted the cup is revolved 90 deg. into its normal position and bolted to the tie. The third-rail is then blocked up into position and erected in the usual manner.

Between supports the major portion of the insulating qualities is provided by porcelain insulators held in position by U-shaped pieces of flat iron strap. These insulators also serve as the supports for the protection proper which is simply an inverted trough.

The construction described permits rapid and cheap erection and at the same time provides high insulating qualities. Since the protection boards or trough are not relied upon for the major portion of the insulating quality they can be creosoted and their life thus materially increased without appreciable detriment to the insulation. Rapid deterioration of the inner surface of the protection due to contact with the rail is avoided. The first cost of the protection will probably be less since the protection trough can be made in quantity in the shop and the high cost of carpenter work in fitting the protection to the rail along the right of way will be avoided. Space for bonding is provided between insulators.

Painters' Putty and Shellac for Repairing Controller Division Plates

BY R. H. PARSONS, ELECTRICAL FOREMAN

Controller division plates are subjected continually to heavy arcs so that they are gradually eaten away until there are holes through them. Long before that time it is necessary to renew the plate to prevent more serious trouble. These plates vary in cost from 11 cents each upward, according to the type of controller and the manufacturer, in addition to which some labor is involved in renewing them.

A very simple and surprisingly efficient manner of repairing such plates lies in the use of painter's putty and shellac as hereinafter described. Although the use of putty would seem to mean patch work a trial will prove it to be a kink worth knowing.

When the car comes in for inspection or shop repairs and the division plate is found with a burn hole it can be repaired, unless the plate is nearly gone, in the following way:

Without removal from the arc deflector, scrape every particle of burned or glazed parts from the division plates to leave the hole well cleaned. Then shellac the entire surface.

Mix together good shellac and putty until it is thinner than putty alone, but pliable and sticky. Then fill up the hole, making a neat, smooth job. After a few minutes shellac again over the plate. For the best results the filling should be allowed to stand as long as possible, say twelve hours. If the car or controller cannot be held out of service, one hour will do. In the latter instance the surface would burn a little when exposed to a heavy arc, but the harder under-layer would not be affected.

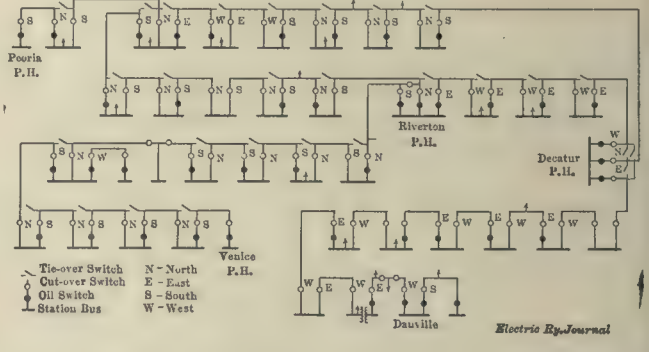
Any plate which has enough left for the putty to cling to can be repaired in this manner for a life equal to and often longer than that of a new plate. The same scheme will apply to line switches and contactors, except in cases where the arcing plates are purposely made of light material. In the latter case it would be cheaper to throw them away than to spend labor on repairs. The arc plates and chutes of circuit breakers can also be repaired advantageously by the same process.

Power Dispatching

BY G. L. FITCH, POWER DISPATCHER ILLINOIS TRACTION SYSTEM

The position of power dispatcher on an electric railway has been advanced until it now has become one of the most prominent in the economic operation of the road. The time when the electric energy could be handled by the train dispatchers or the line could be cleared for work by the co-operation of the linemen and the substation attendants has passed, and many of the larger roads now place the responsibility on one man.

In order to give an idea of the duties involved in power dispatching on the Illinois Traction System, a brief description of the arrangement of the power houses, substations and facilities for handling power, is necessary. In general the system radiates in three principal branches from Springfield, Ill., situated at the approximate center of the State. One branch extends to Peoria, Ill., a distance of 75 miles, another to St. Louis, Mo., a distance of 98 miles, and a third to



I. T. S. POWER DISPATCHING—DIAGRAM OF HIGH-TENSION CIRCUITS

Danville, Ill., a distance of 123 miles. These branches, together with several connecting lines, form an interurban system of 427 miles in length.

Energy at 33,000 volts for these interurban lines, as well as for supplying power and light to consumers distributed over the entire system, is furnished by four power houses situated one at the end of each branch and one at Riverton, Ill., near Springfield, or the center of the system.

The Venice power house at the St. Louis extremity of the line is the largest and contains two turbo-generators, one 5000 kw and one 3000 kw, and also one 1000-kw Corliss, direct-connected engine. In this power house also is a substation with two rotaries, each of 1800-kw capacity, which supply the interurban lines and a small city railway system. A 1700-volt lighting and power transmission line to Edwardsville, Ill., 22 miles distant, is also supplied from this station.

The Riverton power house, at the center of the system, has a total rating of 4000 kw with three units consisting of two turbines of 2000-kw and 1000-kw capacity, and one 1000-kw Corliss, direct-connected engine. This station also contains one rotary converter of 300 kw and the generating capacity will be increased further by a 5000-kw turbine which is in the course of installation.

At Danville, the eastern extremity of the line, is one of the smaller stations which also furnishes power for the city railways, one of the properties of the Illinois Traction System. This station contains a 2000-volt a.c. Corliss unit, direct connected, one 1000-kw d.c. generator and one 1000-kw rotary converter. Additional

capacity is being provided for by the installation of one 5000-kw a.c. turbine.

Peoria, at the northern extremity of the system, has a capacity of 4000 kw a.c. in two units, a 3600-kw d.c. unit and two rotary converters of 1800 kw each. In addition to the energy furnished to the interurban lines this station supplies power to the Peoria City Railway and the Peoria & Pekin Terminal Railway.

Spaced at equal distances of approximately 10 miles, between these power stations are thirty-four substations in which the 33,000-volt a.c. energy is transformed to 650 volts d.c., at which potential it is fed to the trolley. These rotaries are of several types embracing the Stanley, Westinghouse and General Electric and range in capacities from 300 kw to 750 kw.

A three-phase, 33,000-volt transmission line connects all of the power houses and substations through two sets of disconnecting switches located at each substation. Also on the outside of each substation in the line, between the ingoing and outgoing lines, are disconnecting switches of the Burke, Delta-Star air-break and General Electric outdoor, underhanging type, which permit

1-30-14-2M 67230

ILLINOIS TRACTION SYSTEM

RECORD OF TROUBLE

CLASS OF TROUBLE: Trolley Break — DATE: 12/5/14.

DIVISION: Springfield — TIME OFFICE NOTIFIED: 3 10 A. M. — NOTIFIED BY: Dispatcher

REPORTED FOR REPAIRS TO: E. Quick — TIME REPORTED: 3 45 A. M. — TIME REPAIRED: 7 10 A. M.

EXPLANATION OF DELAYS:

REMARKS: Break at Lick Creek — 100 feet down. Broke at splice. Cost.

Material	$ 11.11
Labor	4.61
Line Car	4.29
	20.01
Cred. for old Trolley	6.00
Total Cost	14.01

I. T. S. POWER DISPATCHING—TROUBLE CARD

any station to be cut out without breaking the line. These last switches have been found very convenient on numerous occasions, being used to clear the high tension in a substation while repairs are being made.

There are two separate telephone lines connecting the power houses and substations. One line is used by the train dispatchers and the other for commercial business, both centering on a switchboard in the power dispatcher's office at Springfield. The power dispatcher has precedence over all other business during high-tension trouble, hence direct conversation may be held with the engineers at the power houses or with substation attendants at all times. In case both these telephone lines are out, a long-distance Bell telephone is available. All maintainers are provided with a test set which they connect to the telephone line when requesting that the high tension be cleared for making repairs. Thus the power dispatcher is enabled to notify them in case any trouble occurs on another part of the system, which would make it necessary to put the power through the cleared section.

Procedure in Handling Power

The Illinois Traction System has passed through the experimental stage of handling power through the train dispatchers. This method proved unsatisfactory on account of the different dispatching divisions, in which each dispatcher endeavored to handle the power for the best interest of his own division. Power dispatchers were first located at Decatur, Ill., where they worked shifts of twelve hours each and reported to the operating engineer. At that time they were made responsible for the proper distribution of the power and the handling of all high-tension switches in power houses or substations. In other words, no one was allowed to open or close a switch without direct orders from the power dispatcher. This also applied to the 2300-volt signal power transmission line which is fed from several of the substations.

This arrangement continued until about two years ago, when the superintendency of the overhead and substations was transferred to the signal engineer and the power dispatcher was moved to Springfield. This new arrangement has worked out very satisfactorily since it gives the power dispatcher the proper authority over the signal maintainers, thus permitting cases of trouble to be handled with greater dispatch.

Power Dispatching Methods

When the power dispatcher is asked to clear the line between two stations, the lineman must stay on the line until it is reported clear. During this time the lineman hears each order given to the substation attendant, and is thereby assured that the correct directions have been given. In clearing the line the power dispatcher first orders the attendant to drop his oil switch, pull out his disconnecting switches on the side of the station he wishes to clear, and be certain that his tie-overs are open. When the attendant reports back that the orders have been executed, the dispatcher clears the substation at the other side of the defective section by similar orders. After ascertaining that the lineman has his test set connected, the dispatcher reports the line clear. This makes the lineman who is asking for the line responsible for the rest of the men with him, since no one else can order the power on, and then only through the power dispatcher.

Most power interruptions occur during electrical storms due to the breaking down of insulators, and in many cases the wire is burned in two. This has been overcome as much as possible by requiring the maintainers to keep close watch for broken insulators and to make renewals promptly with new 45,000-volt insulators which have been adopted as standard.

In addition to handling the power, the night power dispatcher has charge of the terminal at Springfield. The day power dispatcher operates the telephone exchange from the six lines, keeps in touch with the linemen, telephone, signal and substation maintainers, who report to him three times a day to receive orders or report cases of trouble. In addition to these duties a record is kept and turned in to the assistant general manager each day showing the trouble of the previous twenty-four hours for all substations, high-tension lines, telephone lines, trolley and signal systems.

In order to facilitate the work of the dispatcher a chart of the transmission lines and substations is placed in front of his desk. This shows the manner in which the 33,000-volt lines enter each station, also the locations of the smaller power lines. Another conveniently-located chart enables the power dispatcher to keep a record of the substations at which extra men are worked. A third chart, also hung near by, shows the 2300-volt signal line with all switches, and a fourth chart is used to show the different places where the 33,000-volt line may be cut, red pegs being inserted to indicate at a glance which switches are out in every substation. In addition to this last chart, as a further check, a large record sheet is kept to make note of each change, all cases of station and high-tension trouble and the names of persons who are working on the high-tension line. A report is turned in each day by the different substations, and a trouble card is made out for every case of power interruption, the latter being shown in one of the illustrations. These reports are filed as to date and are kept as a permanent record.

Linemen's Non-Electric and Electric Searchlights

A necessary part of the equipment of the cross-country lineman is a searchlight outfit to permit him to examine insulator or other line equipment on the poles or towers. In a recent trip through central New York two different combinations for this purpose were found.

The Buffalo, Lockport & Rochester Railway, which has 60,000-volt transmission lines, furnishes its linemen with an outfit comprising a Prestolite Type MC (motorcycle) tank, a "Grandad" solar lamp of 9½-in. front diameter and 6¼-in. depth, made by the Badger Brass Manufacturing Company, Kenosha, Wis., and the necessary harness for conveniently carrying the outfit. The tank holds fuel to provide light for twenty hours, from which it is evident that its weight, now 10¾ lb. including the strap, could be somewhat reduced by providing a size to hold only one night's supply. The lamp alone weighs 7¼ lb. Its rays will show a cracked or crumbled insulator at 50 ft. The cost of charging the twenty-hour tank is only 50 cents to 60 cents, as against twice that sum for five dry cells.



MANNER OF CARRYING AND USING TANK OUTFIT

The neighboring New York State Railways—Rochester Lines—have, for the last three years, been using a battery outfit with tungsten lamp and high-power parabolic reflector, all mounted in an aluminum case and weighing 2½ lb. The cell capacity is good for ten hours, and the illumination is ample for inspecting cross-arm fittings on poles 40 ft. to 45 ft. high. The trade name of this outfit is "Niagara Flashlight" and it is made by the Niagara Searchlight Company, Niagara Falls, N. Y. It is listed at $10, but is usually sold at about one-third less. It has the distinct advantage of being readily carried as a part of the equipment in a lineman's belt.



LINEMAN'S SEARCHLIGHT OUTFIT ASSEMBLED BY THE BUFFALO, LOCKPORT & ROCHESTER RAILWAY

Fire-Fighting Car at Duluth

George D. McCarthy, assistant secretary Commercial Club, Duluth, Minn., presents in the February issue of *The American City* the following data on a fire-fighting trolley car used at Park Point, a suburb of Duluth.

An unusual condition was responsible for the equipment, but the same idea may be found applicable to other isolated suburbs where poor roads or other barriers prevent ready response by horse or motor equipment.

The harbor of Duluth is formed by a narrow strip of land extending across the western end of Lake Superior. This strip, only 400 to 600 ft. wide, extends for 7 miles from the Minnesota to the Wisconsin shore. About 3 miles of it, extending from the Duluth shore, are built up with a variety of residences.

The settled portion of Park Point, as the suburb is called, is cut off from the city proper by the entrance to the harbor, which is spanned by an aerial bridge. It would take too long to cross this bridge to respond in time to a fire alarm. However, this is not the main obstacle to reaching the houses at Park Point with fire-fighting apparatus. This suburb is so narrow that only one street is laid out. The car tracks are laid in that street, the surface of which is beach sand, loose and shifting and offering no foundation to team travel.



DULUTH OPEN CAR USED FOR FIRE-FIGHTING

The fire-fighting problem proved a difficult one for many years. Bucket brigades did what they could, but when a house on Park Point took fire the chances were ten to one that it would burn to the ground. Insurance rates were high, permanent residence was discouraged and cheap construction encouraged. A fire tug would solve the problem under ordinary circumstances, but the water along the shore is so shallow that a fire tug could not approach.

Some bright mind hit upon a trolley fire department. The co-operation of the Park Point Traction Company was obtained. In 1907 a car that was in good condition, but had served its usefulness as a passenger car, was purchased by the city for $650. The seats were taken out and the braces retained. A hose box was installed the whole width of the car. It was left open at both ends, so that no matter which way the car is going it can carry the hose line from the hydrant to the point of the fire.

The equipment consists of 1500 ft. of 2½-in. hose, two shut-off nozzles, twenty 26- and 30-ft. ladders, a 14-ft. roof ladder, six axes, four pike-poles, two 6-gallon Babcock extinguishers, extra charges, rubber coats and hats for volunteers.

Under the arrangements with the railway, the city agreed to pay the company $30 a month, for which the company erected a house for the car, keeps it in repair and furnishes a man to operate it when an alarm of fire is turned in. The car is stored near the main offices of the company, so there is always a motorman on hand to respond to an alarm.

When an alarm is turned in from Park Point the car is started down the tracks immediately, and has absolute right of way; an automatic electric gong is cut in as soon as the car starts, so that all along the Point notice is given that a fire alarm is being answered. Volunteers are picked up on the way and are usually plentiful. As soon as the alarm arrives at headquarters it is conveyed to the nearest regularly organized company, and the members respond without equipment. Usually the volunteers have checked the fire before they arrive.

London Ticket-Selling Machine

A ticket-printing machine has been on trial service at the Victoria underground station of the Metropolitan District Railway, London, England.

This machine is arranged to print, cut and deliver at the counter five distinct types of 1¼-in. x 2¼-in. tickets of the following fare denominations: 1d., 1½d., 2d., 3d., and 4d. Cardboard in narrow strips is stored in five rolls and is fed into the machine. The motor of this machine is put in operation by the ticket agent, who depresses the small lever corresponding to the denomination of the ticket required.

The mechanism is contained in a metal box about 2½ ft. wide and 1½ ft. high attached to the wall above



INSTALLATION OF TICKET-PRINTING MACHINE AT VICTORIA STATION, METROPOLITAN DISTRICT RAILWAY, LONDON, ENGLAND

the booking window. Counting machines are located above the levers, with indicators showing to the operator the number of tickets issued of each denomination. During nine weeks the machine issued 119,568 tickets.

Each ticket is printed in the regular form, and gives the destination, route, transfer directions, class and fare. The date is also printed across the end.

The machine has proved satisfactory except for occasional imperfections in cutting from the roll, and somewhat indistinct printing. The delivery of the ticket is very rapid; in fact, it is often on the counter before the purchaser is ready for it. One hundred tickets a minute can be issued. The management believes there is a future for such a machine and that present defects will be overcome after a reasonable period for experiment with different inks, paper stock, etc.

Illuminated Guide Signs In England

Transparencies installed on trolley poles, to denote the direction of various routes from important centers, are a favorite mode of advertising with European street railway companies. The London United Tramways,



TRANSPARENCY OF LONDON UNITED TRAMWAYS WITH ARROW INDICATOR

Ltd., utilizes signs of this description, notably at the Shepherd's Bush terminal point in West London, and at other transfer points.

The signs are about 2 ft. x 3 ft. x 5 in., a sheet-metal



TRANSPARENCY OF LONDON UNITED TRAMWAYS CARRYING SCENE ON COLORED GLASS

frame with ground-glass panes forming a transparency. The glass faces are variously inscribed, some merely setting forth principal destinations in black letters, with red arrow, as in the case of the route direction to Ealing and other towns, reproduced herewith. Other signs bear painted scenes or figures in colors, men-

tioning some notable attraction—a park or public resort, for example. These signs are illuminated by eight or ten small-wattage lamps, half on either side, in simple white refractors which diffuse the light throughout the interior, lighting both faces. Connection with the electric railway poles is with ornamental iron brackets clamped on the pole.

While the cost of operating such signs on the railway lighting services is inconsiderable, their effectiveness in directing the public to its proper destination is sure to be of value.

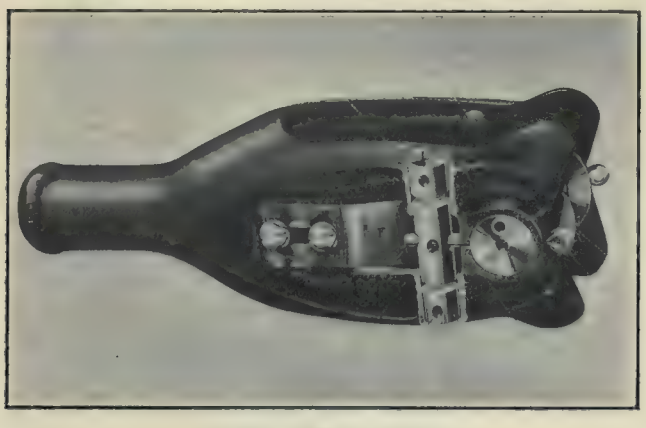
Non-Arcing Harp and Oil-less Bushing

New designs in trolley-wheel harps and bushings are now being offered by the More-Jones Brass & Metal Company, St. Louis, Mo. The company's non-arcing harp for high and low-speed service has as its chief feature a method for gripping the axle pin securely. This feature prevents deterioration due to the arcing which arises between the pin and harp when the connection between these parts is loose.

The other new product is the V & K type oil-less bushing which has been developed for use in all of the forty-eight wheel designs of this manufacturer and which is also adapted to any other make of wheel. These oil-less bushings are recommended particularly for city and suburban service.

An accompanying illustration shows the new harp with a portion of the frame cut away, so that the details of the pin-locking device may be clearly seen. This harp is bottle-shaped, to eliminate the possibilty of catching on the overhead wires. The harp is made of malleable iron or bronze, as required, and is designed with standard pole-fit dimensions.

The patented gripping device for locking solidly and holding the axle pin securely consists of right and left-hand steel screws fitted into the limbs of the harp. A central gripping nut made of bronze connects the two opposing screws. Movement of this nut in one direction serves to clamp the harp body metal tightly around

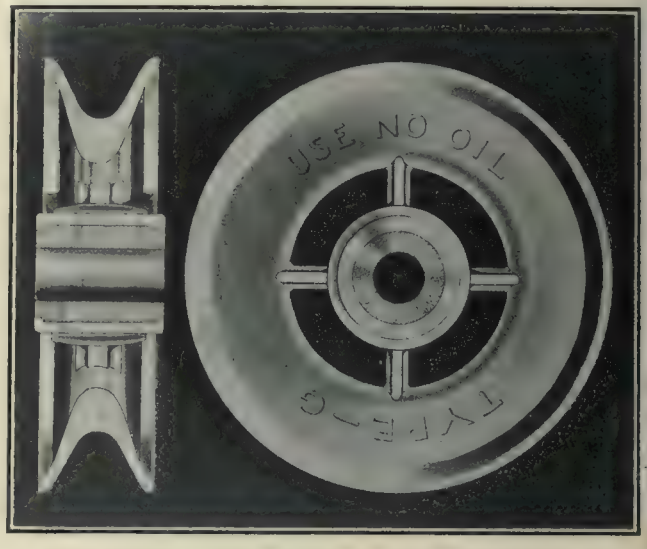


NON-ARCING HARP

the axle pin. Reverse movement loosens the pin. In practice this movement is obtained by turning the nut. The axle pin is locked in place by a cotter pin passing through harp, axle pin and the center of the locking nut. Thus the pin is held rigidly in place and no opportunity for chattering and arcing is afforded. This tight fit in the harp assures maximum wheel mileage because it affords a rigid bearing for the wheel. Also this rigid fastening maintains a good path for the flow of current between the axle and the harp and thus the contact springs are relieved of part of their usual duty.

By means of the expanding and contracting feature of the gripping nut a wide range of adjustment is possible in the axle pinhole. This greatly simplifies the operation of inserting or removing a pin. It obviates entirely the necessity for the common and sometimes destructive practice of driving pins in and out with a hammer whenever wheels are changed. From the operating standpoint the foregoing features, particularly that of being able to change wheels on the road without the use of tools, should be attractive.

The manufacturer states that this type of harp is adapted for any make of wheel and that any wheel in this harp, notwithstanding its type or manufacture, will show 30 per cent. to 50 per cent. greater life than with the ordinary harp, this increase being due to the rigid pin bearing. The gain is effected because of the absence of wear in the pinholes. This harp when fitted



SECTIONS OF TROLLEY WHEEL AND OIL-LESS BUSHING

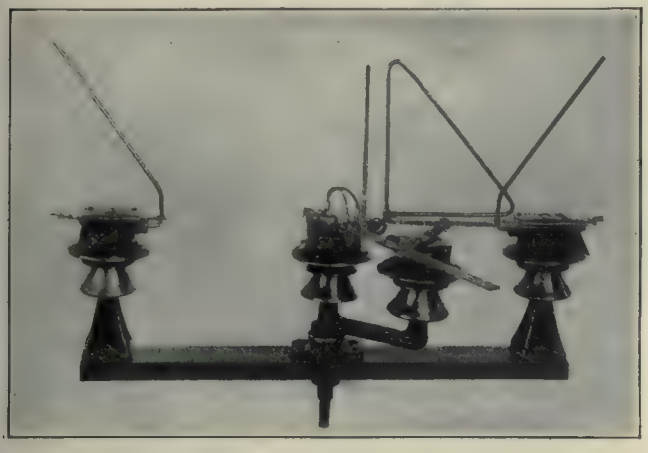
for high-speed service has contact springs with single rubbing surfaces. The springs are held in place by two screws threaded into bosses on the harp casting. With this construction the springs may easily be replaced without cutting rivets.

For high-speed service the company recommends its solid or hollow case-hardened axle pin, lubricated with grease. For city and suburban service the new More-Jones oil-less trolley-wheel bushing is recommended. A wheel with this type of bushing inserted is illustrated herewith. The distinctive feature of this wheel is the patented Simpson graphite and bronze gauze bushing. This bushing consists of a solid bronze housing of standard exterior dimensions which make it interchangeable, and an interior bearing material of bronze gauze impregnated with graphite and hydraulically compressed into the bronze housing.

One of the important claims which is made for this type of bushing is the following: It has high conductivity and consequent low drop in voltage between the line and the motor circuit, because the bearing is made of conducting material and because it is self-lubricating without the use of oil or grease. Another important factor in favor of the oil-less bushing is that the expense connected with the usual frequent lubrication of other types of wheels and the destructive effect of oil on car roofing are avoided. Also the first cost of the bushing includes the final and only lubricating cost. In cold weather the lubricating qualities do not vary as when oil or grease are used. The harp and wheel are always clean and in fit condition to be handled by car crews if wheel changes on the road are necessary. When once properly assembled no further attention is required until the wheel is worn out.

Double-Throw Horn Gap Switch

A single-pole unit of a new double-throw horn gap switch is shown in the accompanying cut. The main contacts of the switch are protected from all burning by auxiliary arcing horns. A feature of particular interest is the use of two blades at an angle of 60 deg. from each other. With the use of two blades mounted in this way it is necessary for the switch to rotate



DOUBLE-THROW HORN GAP SWITCH

through less than 120 deg. of the circle, which condition allows a simple crank and connecting bar type of operating mechanism to be used for interconnecting three such units for simultaneous operation.

A three-pole switch of this type for 22,000-volt service can be carried on the top of a single wooden pole. The equipment is manufactured by the Railway & Industrial Engineering Company, Pittsburgh, Pa.

Winch for Pole Handling

The Northern Engineering Works, Detroit, Mich., has recently supplied one of its Northern motor truck hoists



PLATFORM DRUM WINCH SETTING POLES

or winches on a Packard truck for use by the Public Lighting Commission of Detroit.

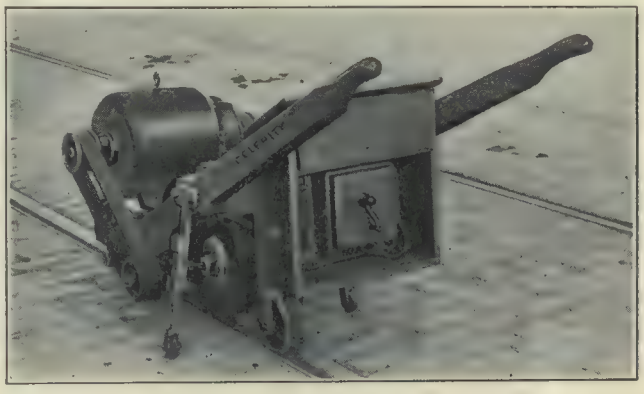
This hoist is of the platform drum winch type with inclosed gears, is made in both spur-geared and worm-geared form and is driven by a clutch connection from the motor shaft of the truck. It can be used either in the form of an ordinary winch for hauling articles off and on the truck or in connection with boom and tackle as shown. The gears are all cut, running inclosed in oil. The drum is machined and is made in various sizes, according to the amount of rope that is to be wrapped. This winch can be applied to any truck but is usually recommended for those of very heavy capacity. It is made in various sizes from 1000 to 2000 lb. capacity, single line.

A One-Man Rail Grinder

The Equipment Engineering Company, London, Eng., is the maker of the "Celerity" rail grinder which is designed for leveling rail joints, deepening grooves, switches and crossings, and executing all other kinds of grinding work in connection with rails. It is very light, weighing only about 420 lb. complete. The weight of the motor is balanced over the running wheel to give the requisite pressure for the grinding wheel and relieve the operator as much as possible.

The machine can easily be wheeled along the track by one man, or placed on the car front. Street obstruction is reduced to a minimum, as a width of only 2 ft. is occupied, and the ordinary highway traffic can use the side paving just as if no grinding were in progress. As but one rail is occupied at a time, it is easy to wheel the machine out of the way of passing cars, and put it on the track again as soon as the line is clear.

The power is obtained direct from the overhead wire, and as the motor is close to its work, one of low output



ONE-MAN ONE-RAIL GRINDER READY FOR WORK

is sufficient to drive the grinding wheel. The power is transmitted by belting, the elasticity of which, in such intermittent work as grinding, is valuable.

The machine is operated by one man only, who stands in an easy upright position and moves the grinder forward and backward over the rail joints. The motor starter is within easy reach, so that the machine can be stopped instantly by the operator without the assistance required in the case of most grinders. The labor costs of operating this machine are about one-half of those for other types, since one man only is required to work the grinder, with the help of a boy, if the condition warrants it, to ward off other traffic and remove the trolley attachment when cars are passing.

As the machine is of the mono-rail type, its bearing is instantly obtained. The second wheel is merely provided to carry the frame and is fitted with an adjustable spring sufficiently powerful to lift the grinding wheel clear of the rail immediately the pressure of the hand is removed, so that the depth of cut is regulated by the pressure of the hand on the shafts. In addition to the sense of touch, the operator is also enabled to know the depth of cut taken by the quantity of sparks from the grinding wheel. The automatic cutout in connection with the starter is so arranged that the machine cannot be made to cut too deeply. The grinder is already in use on many systems in England and elsewhere including Blackburn, Darwen, West Ham, Southampton, Wigan, S. Shields, Bolton and Salford.

LONDON LETTER

Tramway Prosperity Affected by War—Some Roads Extending—Women Conductors Considered in Edinburgh

(From Our Regular Correspondent)

A further reduction in the dividend of the Dublin United Tramways from 5½ per cent to 5 per cent was recently announced. The report shows that the distribution could have been maintained, but the directors decided on a conservative policy, owing to the war. After paying all interest charges, the sum of £98,000 was available for dividends. A year ago, only £10,000 was set aside for renewals. This year £23,000 in all is specially appropriated, and the amount carried forward is increased from £9,500 to £11,400.

Although the revenue of the Manchester Corporation Tramways undertaking shows a considerable falling off for the nine months of the municipal year recently completed as compared with the corresponding period of the previous year, the receipts for the past few weeks have been on the up-grade, and have been actually in excess of those for the early part of last year. The all-night cars, which have now been running upwards of a year, have not been profitable, but as they have proved a great convenience the committee has decided to continue them.

Owing to the increased cost of living, the executives of the Amalgamated Society of Tramway & Vehicle Workers at the monthly meeting at Salford unanimously decided to permit all branches of the society to apply for an increase of 15 per cent in wages. The society has a membership of nearly 30,000, and the meeting was attended by representatives from London, Manchester, Birmingham, Leeds and Wales. At the close of the meeting the secretary stated that the executives had a number of applications from the branches for permission to apply for increases in wages owing to the extra cost of living.

Railless trolley omnibus schemes seem popular in South Wales, and following upon the opening of the 5-mile route from Williamstown, through Tonyrefail, to Gilfach Goch, in the Rhondda Valley District, comes a proposal from the Aberdare Urban District Council to make extensions totaling about 5 miles in that area for operation by railless traction. The estimated cost is nearly £50,000.

The question of the lighting of the Leicester tramway routes was discussed recently at the meeting of the Leicester watch committee. Experiments have been made with the high pressure gas system near the gas offices and elsewhere, and with electric light at the end of Horsefair Street, the Midland Station, and suspended central lights on the recently constructed tramway in King Richard's Road. The lighting sub-committee submitted a unanimous recommendation to the watch committee in favor of electric light for the illumination of tramway routes generally, and this was adopted subject to the approval of the Council.

The extension of the Bakerloo Railway from Paddington to Queen's Park has been opened for traffic. It makes an addition of 2 miles 36 chains to the mileage of this railway, which now extends from the Elephant & Castle, on the south side of the river, to the Queen's Park station on the main line of the London & Northwestern Railway, a total distance of about 7 miles. There are four stations on the new extension. The extension serves a large and populous district, and enables travelers on the tube system to join the trains of the London & Northwestern Railway running on its new line to Watford. When this new line has been electrified through trains will be run from the Elephant to Watford, but at present it is necessary to change at Queen's Park. The lifts at these new stations have been abandoned in favor of escalators, and long passages have been carefully avoided.

The report of the Board of Trade on London traffic, just issued, deals largely with the growing necessity for increasing main arterial roads owing to the constant expansion of traffic. Theoretically, the substitution of motor for horse-drawn vehicles should tend to lessen congestion, but practice shows that the intermingling of fast motor traffic and slow horse traffic neutralizes the advantage. As to obstruction, the horse vehicle takes first place and the electric tramcar second. The report adds that opinions have been unduly influenced in favor of the electric tramcar by its carrying capacity and its comparative immunity from fatal accident, but that these factors cannot be taken into consideration when dealing with road obstruction. In the case of the motor omnibus, while its power of acceleration and retardation is not so good as that of the tramcar, its flexibility enables it to circumvent obstructions and to give room to overtaking or meeting vehicles.

The Edinburgh Tramways, which has sent between 300 and 400 men to the army, is considering a proposal to replace some of the enlisted employees with women conductors. The work is not more arduous physically than some in which women already engage, and much of the mounting of stairs which it involves on most types of tramcars might easily be avoided if passengers would tender their fares to the conductor as soon as they stepped on the platform.

In the report of the London & Southwestern Railway for the year ended Dec. 31, 1914, it is stated that the work connected with the electrification of the company's suburban lines has, notwithstanding various difficulties, made steady progress during the year. The main power house at Wimbledon and the substations at other places are practically complete, and the machinery is being erected. Several of the trains are ready. Good progress has also been made with the placing of conductor rails, the bonding of track rails and the laying of high-tension cables on the first section of the railway to be electrified, namely from Waterloo to Kingston via Twickenham and Malden.

According to the London County Council returns as to recent tramway receipts, about £10,000 was lost as a consequence of the tramway breakdown some weeks ago. During that week 3,000,000 fewer passengers were carried. Now the Council proposes to arrange for linking up the system with other sources of electrical supply. The London Electric Supply Corporation is already furnishing the Council with energy, and the company has now offered a further supply up to 3500 kw at a price of £3 a kilowatt a year, plus a stated price per unit for at least six months. The Council is to have the option of extending the arrangement for a further period of six months. If at any time after the expiration of the first period of six months the Council merely requires a supply of power for standby purposes only, the charge to be made will be at the rate of £2 a kilowatt a year. The electrical energy will be provided at the company's Deptford generation station, and the Council is to furnish the requisite high-tension cables to connect this generating station in parallel with the Council's Greenwich generating station. When the necessity for continuing these arrangements has ceased, the cables can be retained between the two generating stations and utilized for providing such power as may be required on emergency, or they can be withdrawn from the ducts and used elsewhere.

The electricity scheme promoted by the London County Council has been killed by the Council itself. In November last the Council decided to obtain Parliamentary authority for its proposals, and the bill dealing with the matter has been duly deposited. Under Act of Parliament, however, it was necessary that the resolution of November should be confirmed by an absolute majority of the whole Council. That majority the scheme has not secured. The reasons for Progressive hostility were explained by Sir John Benn, who pointed out that the scheme, on its technical side, contained the basis of a settlement, but that the proposals were vitiated by bad finance, the flouting of Parliament, the breaking up of local government, and the surrender of the rights of the ratepayers. The borough councils, as a body, were also against the bill, while ten of the wealthy companies were combining against the Council with a view to presenting an opposing bill.

At the annual meeting of the City & South London Railway, the chairman stated that but for the war the company would now have been well forward with the reconstruction authorized by Parliament in 1913. When the war came plans and drawings had been passed and arrangements made with contractors and a portion of the money had been raised, but no contractors' men had been set at work. When this railway passed under the control of the Underground Electric Railways, London, it was intended to increase the tubes to the same size as the other tubes controlled by the company and to furnish new rolling stock of a type similar to that used on the other railways. This work, however, has been entirely suspended for the time being.

A. C. S.

News of Electric Railways

NEW YORK COMMISSION INVESTIGATION

Among those who testified on Feb. 25 were Mayor Mitchell, President McAneny of the Board of Estimate, and Frederick W. Whitridge, president of the Third Avenue Railway. Both Mayor Mitchel and Mr. McAneny agreed in the main points of their testimony. About transferring the construction work from the commission to the Board of Estimate, they thought it advisable theoretically. The drafting of a new charter seemed to afford an opportunity for the transfer. Mayor Mitchel thought that the transfer should come into force on Jan. 1, 1918, at the beginning of the next city administration.

Mr. Whitridge thought that the original commission, appointed by Governor Hughes, had made the public service law ridiculous, while their successors were courteous and sensible. The first commission treated its large powers like a plaything. He had to call the attention of the original commissioners to the fact that it was a misdemeanor to disseminate false information about the value of securities. Asked what he would do about constructing the subways, Mr. Whitridge said he would get Colonel Goethals and tell him to go ahead. He thought the expenditures of the commission should be limited to $400,000 or $500,000 a year. He favored taking from the commission the right to issue orders, and requiring it merely to report facts to the courts, which would have the right to make orders. If he were commissioner he would send for the right man and tell him what he wanted and if he refused he would call in the newspapers and have a hearing.

On Feb. 26 the committee had on the stand as witnesses ex-Mayor Seth Low, ex-Chairman of the Commission W. R. Willcox, George B. Cortelyou, president of the Consolidated Gas Company; Theodore P. Shonts, president of the Interborough Rapid Transit Company, and Timothy S. Williams, president of the Brooklyn Rapid Transit Company. Mr. Shonts favored regulation. He did not consider that the commissioners so far appointed had tried with earnestness to solve difficult problems. He did not see how regulation could be carried on effectively except by somebody in daily touch with the companies. He had a very high opinion of Alfred Craven, chief engineer of the commission, and the other engineers of the commission, but even these men were not so well qualified as the company's own men to say what was best for the practical operation of a railroad. There had never been any conscious effort on the part of the Interborough Rapid Transit Company to evade the orders of the commission. He thought that the rule of reason should be applied to violations of the commission's orders. He did not quite know how far the authority of the commission went, but it certainly should not extend to making up the company's train schedules or saying how much it should spend on maintenance.

Mr. Williams said that without any disrespect to any of the gentlemen who had occupied the position of commissioner it was indisputable that not one of them had, at the time of his appointment, any administrative or technical experience to qualify him for the office. The men on the commission were, with few exceptions, of sincere purpose and industry, but they had to be educated in office to a knowledge of the necessarily complicated problems upon which they were called to decide. He thought that the wheelguard order of the commission was purely a matter of personal pride and prejudice on the part of Mr. Maltbie. Mr. Williams criticised the report on Brooklyn Rapid Transit service made to the commission by Joseph Johnson, head of the commission's transit bureau.

Mr. Willcox reviewed the points of difference at which the commission and Mr. Whitridge had come into contact. The law was opposed to the transfer of the rapid transit work of the commission to the Board of Estimate. He thought that a member of the Board of Estimate might be appointed to the commission.

The hearings as regards the commission for the first district were concluded with a session open to the public to present suggestions on Feb. 27. Only two persons availed themselves of the opportunity.

The drafting of the report to the Governor in regard to the inquiry into the first district commission by the legislative committee has been intrusted to a sub-committee consisting of the chairman, the counsel, Senators Mills and Foley, and Assemblymen Meier and MacQuistion. This committee met on March 2 to frame its findings for submission to the full committee. It was said at the time that the sub-committee was divided on the question of how far the report should go in criticising the official conduct of the public service commissioners, but it was expected that the report to the full committee would be made by March 4. On that date the committee was still at odds and the inquiry into the commission for the second district was begun despite the previous threat of William Hayward, counsel to the committee, that he would delay the investigation.

DETROIT PURCHASE VOTE ON MARCH 31

A special meeting of the stockholders of the Detroit (Mich.) United Railway has been called for March 31 to take action on the proposal of the City Street Railway Commission to assume, with the approval of the electors, bonded indebtedness of $24,900,000 in exchange for the lines of the company within the one-fare zone. The company has not as yet given any indication as to what recommendation it will make to the stockholders, but it is understood that the board of directors is inclined to recommend that the city's offer be accepted.

The announcement of the commission's proposal to purchase has already called forth numerous attacks upon the plan, and in the event that the commission and the company reached an agreement a bitter fight is sure to occur before the proposition reaches the public. There are many legal questions involved which must be adjusted before the matter will be in shape for presentation to the electors; in fact it is held by several legal authorities in communications to the newspapers that charter amendments and special action by the Legislature will be required before the city is empowered to assume the company's bonds. The commission is now giving most of its attention to the legal phases.

It is understood that the traffic survey prepared by Barclay Parsons & Klapp, New York, will be presented to the commission by March 15. This survey is an exhaustive study of the transportation needs of Detroit covering present lines, needed lines, rerouting and the subway question. It will undoubtedly have a large bearing upon the entire street railway question.

BAY STATE ARBITRATION HEARINGS

In the hearings before the arbitration board in the Bay State Street Railway wages investigation, C. F. Bancroft, superintendent of motive power and machinery, was called as a witness by the employees' organization. Mr. Bancroft stated that the average hourly wages of armature winders had been increased from 21.05 cents in 1905 to 27.74 cents in 1914. The company had more than thirty carhouses and stations. About 1200 men were employed in the motive power and machinery department. Wages varied with the locality, tending toward higher amounts in the larger places. The company had offered the operating staff at the Quincy Point (Mass.) power plant a bonus dependent upon reductions in the consumption of coal, and in this way wages had been increased. Fifteen years ago the power plants of the various roads now making up the system generally were operated in two twelve-hour daily shifts; about ten years ago ten-hour shifts were substituted, and in 1910 the plants were put upon an eight-hour basis. The wages of all employees in stations had remained unchanged per day, but automatically increased per hour. Mr. Bancroft did not consider power-station work difficult, but felt that it was responsible and trying. There were now forty-three power-station engineers, fifty firemen and thirty-five oilers in the company's service, compared with thirty-four engineers, forty-six firemen and twenty-seven oilers in 1910. A reduced working day in a generating plant correspondingly decreased the amount of work done per man. A 10,000-hp generating unit now requires less labor than a 2500-hp machine did twelve years ago. Such units were increasingly automatic in their operation.

INDIANA LEGISLATURE

A bill has been introduced in the Senate of Indiana prohibiting the location of freight depots within 1000 ft. of places of worship. The following bills have been passed by the Senate: Bill regulating news agencies and requiring the Associated Press to file a schedule of rates with the Public Service Commission; the Symons bill providing that railroads shall maintain flagmen or automatic crossing signals at all crossings where the view is obstructed; bill providing that employers must give service letters to discharged employees upon request. The bill making it unlawful to trespass upon railroad property was killed in the Senate.

Representative Waltz has had withdrawn the 2½ cent railroad fare bill introduced by him, and, in accordance with the recommendations made to the Legislature by Governor Ralston and outlined in his letter to the Central Electric Railway Association at the meeting in Indianapolis last week, Mr. Waltz has introduced a bill giving the Public Service Commission of Indiana the right to increase the passenger rates of railroads to 2½ cents per mile upon petition and examination of the facts showing that such increase is justified.

The following bills have passed the House: the Sare workmen's compensation bill, amended and made a compromise measure; the Feick bill providing for a board of mediation and arbitration for all labor controversies; the bill amending the public utility act by placing stock yards under the jurisdiction of the commission; the bill providing penalties for officers of public utility corporations that collect money in excess of published tariffs, but exempting from this law utility corporations of fourth and fifth class cities that contracted to give free service to manufacturing industries prior to May 1, 1913. The following bills have been killed: amendment to the boiler inspection law providing that all boilers placed in service after July 1, 1915, shall be allowed a factor of safety of not less than 5.5; bill providing that public service corporations giving service by measured rates shall not fix a minimum charge for service.

CINCINNATI SUBURBAN FRANCHISE

The Council of Cincinnati, Ohio, on Feb. 16 refused to entertain the suggestion of the Federated Improvement Association that the franchise recently granted to the Cincinnati, Newport & Covington Street Railway be repealed and that a new ordinance be passed specifically providing that the company shall change the location of its tracks to streets other than those designated to be occupied.

Richard P. Ernst, attorney, representing the company, made an address before the Cincinnati Real Estate Exchange on Feb. 18, in which he furnished a complete analysis of the franchise. The new routes forced upon the company have been found unprofitable by the Cincinnati Traction Company, and the purely local business in Cincinnati will not amount to much. The road carries 30,000 people into Cincinnati every morning. The franchise granted to the company will necessitate the giving of rights, even to a road that might come into Cincinnati from northern Ohio. Mr. Ernst read letters from President Hinsch of the Fifth-Third National Bank and E. W. Edwards, president of the Rapid Transit Commission, stating that they will support the ordinance at the referendum election in March.

CLEVELAND CONSTRUCTION ORDINANCES

An ordinance was passed by the City Council of Cleveland, Ohio, on the evening of March 1 authorizing the laying of a double track on Euclid Avenue between East Twenty-second and East Fortieth Streets. The consents of property owners have not yet been secured. Peter Witt, street railway commissioner, says that the consents are unnecessary under the charter provisions. This section of Euclid Avenue is known as "Millionaires' Row."

It seems likely that there will be serious opposition to the construction of a street railway on East 123rd Street, Cleveland, although the Council adopted a resolution in April, 1914, agreeing to authorize the expenditure of funds for that purpose on the dedication of the street. The changed financial conditions of the country have made several members doubtful as to the propriety of building the line the coming summer, and the city may not accept the street until there are better prospects for business.

LEGISLATION IN NEW YORK

The following bills have been introduced in the Senate: to amend chapter 478 of the laws of 1893, entitled "An act to incorporate the city of Olean," in relation to the location of street surface railroad tracks in the streets of said city; to amend the railroad law, in relation to fencing right-of-way; to amend the railroad law, in relation to footpaths upon certain trestles; making an appropriation for the elimination of certain grade crossings.

The following bills have been introduced in the Assembly: to amend the railroad law, in relation to lighting railroad cars on steam railroads in cities of the first class; to amend the railroad law, in relation to the rate of fare on certain elevated railroads operating in Kings County; to provide for the improvement of the New York Central & Hudson River Railroad tracks and property along Riverside Park, in the city of New York, to require trains to be operated thereon by electricity; to amend the workmen's compensation law; to amend the penal law, in relation to persons unable to read and write not to act or be employed as engineers, firemen, hostlers, watchers or trainmen in running or operating locomotive engines or trains; to amend chapter 478 of the laws of 1893, entitled "An act to incorporate the city of Olean," in relation to the location of street surface railroad tracks in the streets of said city; to amend chapter 345 of the laws of 1888 entitled "An act to provide for the relief of the city of Buffalo and to change and regulate the crossing and occupation of the streets, avenues and public grounds in said city by railroads," in relation to the care, repair and maintenance of bridges, viaducts and subways at street crossings above and below railroad tracks; to amend the railroad law, in relation to footpaths upon certain trestles; to extend the time of the New York Connecting Railroad to finish its road and put the same in operation; to extend the time of the New York Connecting Railroad to complete the construction of its bridge across the East River, as authorized by chapter 752 of the laws of 1900, chapter 691 of the laws of 1905 and chapter 606 of the laws of 1910; making an appropriation for the elimination of certain grade crossings; to amend the general corporation law, in relation to an action against a corporation to compel specific performance of obligations.

OHIO LABOR LEGISLATION

Representatives of a number of street and interurban railways appeared before the labor committee of the House of Representatives at Columbus on Feb. 18 to protest against the passage of the Ott bill regulating the hours of labor for conductors and motormen. The principal objection was to the requirement that the men have thirteen consecutive hours of rest. J. J. Stanley, president of the Cleveland Railway, said that such a requirement would make a 3-cent fare impossible, as the schedules could not be arranged so that the men could have that period of rest without increasing the number of motormen and conductors very materially. The company employed 2500 motormen and conductors and this change would mean a large increase in the wage item.

Frank B. Carpenter, of the Western Ohio Railway; E. F. Schneider, of the Cleveland, Southwestern & Columbus Railway, and F. W. Coen, of the Lake Shore Electric Railway, represented the interurban interests. They contended that it would be impractical to apply the conditions of this bill to the train service without employing many men who would be called upon to work only one or two hours a day. G. Davies, Cleveland, and W. W. Smith, Cincinnati, presidents of the local unions in the two cities, represented the employees. They argued that the schedules of hours could be applied to the operation of cars without much additional expense.

The Myers bill has been recommended for passage by the Senate judiciary committee. It makes legal the service by a sheriff on a receiver of an interurban railway in any county through which the road passes. The Smith bill requiring dust-proof screens for the protection of motormen and conductors on both street and interurban cars was passed by the House on Feb. 16.

A hearing was held on Senator Louis P. Pink's bills by the Senate judiciary committee on Feb. 24. These bills provide that proof of injury to persons or property by

steam or electric railways shall be *prima facie* evidence of carelessness on the part of the operators of the locomotives or cars which caused the injury. Attorneys for the roads said that the bills would make them practically insurers of everything along their right-of-way. It is likely another bill may be formulated that will require claim departments to produce all the evidence they secure.

A resolution has been introduced in the Legislature calling for a detailed statement of the finances from the State treasurer, in order that appropriations might be made in an intelligent manner. This would give public utility companies, insurance companies and other corporations an opportunity to show what they are paying for the support of boards, commissions and other organizations established to regulate their operation.

Senator William Behne introduced a municipal ownership measure on Feb. 24 which is practically a reproduction of the Mills bill of the preceding session. It provides that bonds issued by a municipality for the purpose of constructing a public utility plant or purchasing one already in existence shall be a lien on the entire tax duplicate of the municipality instead of on the property only, as the law now stands. It also provides that bonds issued for this purpose shall not be considered with those issued for other purposes. The Mills bill in its original form was defeated at the last session of the Legislature.

Senator W. R. Collins of Cincinnati has introduced a bill that provides for the cancellation of the lease of the Miami & Erie canal and the payment by the State to the city of Cincinnati of $74,707, which the State has already received as rental for that portion of the property within the city. The bill further provides for a new lease with rent on the property free. The city desires to use this property for a portion of its rapid transit line.

CONDITIONS IN RHODE ISLAND

Men in Charge Under Federal Dissolution Decree Review Problems Before Them

The trustees appointed under the dissolution decree in the New Haven Railroad case to hold the stock of the Rhode Island Company, Providence, R. I., have issued a statement in part as follows:

"The trustees find that nearly all of the property is held by the company under leases calling for the payment of large annual rentals and imposing burdensome requirements; that the company is subject to the terms of a strict franchise agreement with the city of Providence; that there is a contract between the company and organized labor, and that the company has been operated for many years with what, under ordinary conditions, would be considered an undue regard for economy. They find at the present time a reduced income and the necessity for increased expenditure. These are conditions which the trustees did not create and which at present they are unable to change and they seem to call for considerate judgment on the part of the public.

"That which is most needed for safety of operation must be done first and less pressing needs must be attended to in their order. Within the last fifteen years the company has adopted as its standard a type of platform collection or prepayment car which compares favorably with the cars of other cities, except that in many places where there are wider streets a much larger car can be used. The adoption of the prepayment car as approved by the city of Providence necessitates a very early abandonment of the small cars still in use, and large expenditures for radical repairs to such small cars are not therefore justified. New cars are needed and are being constantly put in commission, but all that are required cannot be obtained at once.

"Neither in Providence nor elsewhere has it been found possible to provide, by any system on, or above, or below the surface of the ground, all the transportation that is demanded at rush hours. Every effort will be made to provide it here, but complete success cannot be hoped for. It is to be borne in mind that during the greater part of the day cars are not occupied to nearly their seating capacity, and that there must be some relation between income and outgo. It costs about $10,000 per year to keep in operation a single car, and additional cars cannot be put on unless the service demands them.

"The company has, we believe, an excellent corps of employees who share with the directors the desire to make the service the best possible. The trustees hope to give the community all the service that it is in their power to give. To this end they invite rather than resent fair and intelligent criticism, and suggest that such criticism be made in the first instance to the officers of the company and especially to A. T. Potter, the vice-president, who will either himself act upon them or else bring the matter to the attention of the board of directors."

PHILADELPHIA'S AMENDED ORDINANCE

The ordinance in the interest of high-speed rapid transit was put through the Philadelphia Councils on March 4 as amended recently in opposition to Director of City Transit Taylor. The bill was passed by a vote of sixty-two to eighteen in the Common Chamber and thirty-four to eleven in the Select branch. The forces on either side had been sharply aligned long in advance of the meeting. A plan offered by Councilman Dripps to eliminate the specification of routes from the measure was lost. As one paper put it there were "hours of caustic debate and insinuation." The *Ledger* said on March 5:

"The ordinance as passed, Director Taylor declares, nullifies Philadelphia's purpose to build a comprehensive system of high-speed transit. It destroys plans for which the citizens spent thousands of dollars. Common Councilmen Dripps, Conn and Horn, as leaders, fought valiantly to so amend it that it would be possible to construct practical subway and elevated structures. The voters in the galleries and corridors, hundreds who had turned out in support of their interests as taxpayers, added their voices to the pleas of these men, but Connelly, Seger and Costello held the balance of power."

ONTARIO RADIAL RAILWAYS

At the annual meeting of the Hydro Radial Union of Ontario on Feb. 24 representatives of municipalities from all parts of the province indorsed the project for constructing a network of municipally owned radial railways to serve the rural districts. Sir Adam Beck said the Dominion government should grant the usual subsidies to the municipalities, as the proposed lines were for the general benefit of Canada. The time had arrived for stopping the payment of subsidies to private companies. He praised the Toronto City Council and the Harbor Board for the provision made for entrances for the radial lines. Resolutions were passed requesting the Dominion and Provincial governments to grant subsidies towards the cost of constructing the proposed lines.

Reports on Utah Utility Bill.—It was stated on Feb. 25 that two reports on the Evans public utility bill will be made to the judiciary committee of the Senate. The majority report, it was said, would be unfavorable.

P. A. Y. E. Coin Boxes for Ferryboats.—It is announced that the Southern Pacific Company will install coin boxes at the San Francisco ferry terminal so that local ferry passengers for Oakland, Berkeley and Alameda will not be required to buy ferry tickets.

New Oklahoma Road.—The Cushing (Okla.) Traction Company placed about 17 miles of line in operation recently from Cushing to Drumright and has construction work under way for the electrification of 17 miles of steam track between Drumright and Jennings. This is a freight handling line with a large oil tank-car traffic.

Toronto's Transit Plans.—The three engineers who are to plan the new rapid transit system for Toronto conferred with Mayor Church, Sir Adam Beck and the Board of Control on Feb. 26. The Mayor announced later that satisfactory arrangements had been made for the completion of a general plan and that the details and the estimates of cost would probably be ready by Nov. 1.

Chicago to Build 20 Miles of New Track.—In compliance with its contract agreement with the city of Chicago, the Chicago Surface Lines has planned to undertake during 1915

new track extensions which will total approximately 20 miles and rehabilitation work on fifty-one different streets, the amount of work varying from short sections of one block to sections of more than a mile in length.

Full Crew Legislation in New Jersey.—A bill was introduced in the New Jersey Assembly on March 2, calling for the repeal of the full crew law. Another bill authorizes the State Board of Public Utility Commissioners to determine the number of men that shall be hired to operate passenger and freight trains when the passenger trains are made up of three or more cars and the freight trains of six or more cars.

New Haven Reindictments.—The Federal Grand Jury at New York has returned a superseding indictment against the twenty-one officers, directors and lawyers of the New York, New Haven & Hartford Railroad, charging violation of the Sherman anti-trust law. The indictment is similar to the one returned last November, but was found for the purpose of overcoming objections made to the manner in which the first indictment was obtained.

Illinois Legislative Deadlock.—Owing to a deadlock which has lasted for seven weeks, the General Assembly of Illinois is just now preparing to begin work. A speaker has been elected, but he has not appointed his committees. The Senate has been tied up by a contest for power between Republicans and Democrats, and committees have not been named there. In neither house had the introduction of bills been commenced on Feb. 27.

Municipal Line Receives Financial Aid.—Claiming that the Seattle (Wash.) Municipal Railway System is still incomplete and will not have a fair test until it is extended to Ballard on the north, six of the nine Councilmen at a recent meeting of the Council voted to appropriate $10,000 from the general fund to continue the operation of Division "A." Mayor Gill opposed the loan, as noted in the Electric Railway Journal of Feb. 27, page 431.

Extension to Toronto Civic Line Opened.—Mayor Church, of Toronto, Ont., assisted by several Aldermen and chief civic officials, formally opened the new civic car line on Bloor Street on Feb. 23. The civic party made a trip over the entire route from Dundas Street to Quebec Avenue and return. The Mayor acted as motorman and Works Commissioner Harris as conductor. After the trip short addresses were made, and it was suggested the line should be extended to Jane Street.

Couple Arrested for Forgeries.—Frank Harris was recently arrested in Chicago and Mrs. Dora Fitzgerald was arrested in Cleveland on Feb. 23 on the charge of issuing forged checks for more than $2,000, the Northern Ohio Traction & Light Company being the victim. Harris was formerly employed by the company. Shortly after he left bogus checks began to come in bearing the signature of M. M. Erdman, treasurer. The woman is supposed to have been responsible for the penmanship on the checks.

Suit in Seattle.—Scott Calhoun and Joseph Parkin, receivers of the Seattle, Renton & Southern Railway, recently filed in the Federal Court a suit against the city of Seattle, seeking to restrain and enjoin the city from proceeding to appropriate, condemn or damage the company's right-of-way, extending from Jackson Street on the north to Ryan Street, the city limits, on the south. The value fixed by the receivers on this right-of-way is in excess of $1,000,000. The petition will be heard by the court on March 15 unless some other date is agreed upon by the parties in interest.

Bus Franchise Considered in New York.—Members of the committee on franchises of the Board of Estimate met on March 1 to consider the applications for motor bus franchises in Manhattan. Applications for franchises were made more than a year ago. In July so-called model routes were laid out by the bureau of franchises. Mayor Mitchel was asked on March 1 if action on the motor bus franchises could not be expedited so that such vehicles could be placed in operation to relieve the traffic congestion on the Eighty-sixth Street Crosstown railway and the Ninth Street Crosstown line. He said that traffic congestion was no reason for acting on franchise matters not fully matured.

Washington Senate Passes Utility Bill.—With but one vital change, the public utilities bill passed the Senate of the State of Washington on Feb. 24. The measure is an amendatory substitute for the Taylor bill, which established the new principals of granting indeterminate franchises, and required the issuance of certificates of necessity and convenience after a full hearing on the question before a new or competing utility company can enter a field already occupied. The bill gives supervisory powers over municipal corporations which have the franchise-granting privilege, but vests in the various city councils the right to issue the original franchise. As amended by Senator Taylor, its sponsor, the bill is to be submitted to popular vote by referendum in 1916.

Elevated Third-Tracking in New York.—Alfred Craven, chief engineer of the Public Service Commission for the First District of New York, has reported to the commission that with additional reinforcement, which will not cost more than $200,000, the Second Avenue elevated railroad in Manhattan will be strong enough for the operation of trains composed of the composite cars now used in the subway which the Interborough Rapid Transit Company proposes to transfer to lighter trucks and to operate upon the elevated railroads. He is also of the opinion that the Third Avenue elevated railroad will be strong enough for the same operation after the third-tracking work is completed, but suggests that he be allowed six months in which to complete his investigation and decide finally as to the Third Avenue road.

Safety First Federation Meeting.—The Safety First Federation of America, which has for its objects uniform laws for control of automobile traffic and improvement of street traffic conditions throughout the country by a standard system of supervision, was organized in New York on Feb. 26. In addition to the election of a board of directors, which includes police commissioners, representatives of automobile clubs, and civic organizations from fourteen cities, these officers were elected: Vice-presidents, Harold W. Newman, police commissioner, New Orleans; Charles M. Talbert, director of streets, St. Louis; John Gillespie, police commissioner, Detroit; J. H. Lippincott, New Jersey Traffic Commission; treasurer, Charles L. Bernheimer; executive secretary, Frederick H. Elliott, New York. The federation will meet again in Detroit in the fall.

Severe Storm in Missouri.—A storm the night of Feb. 22, followed by a fall in temperature, resulted in the downfall of sixty-two poles on the Excelsior Springs division of the Kansas City, Clay County & St. Joseph Railway. Most of the poles were blown over and not broken. The line was out of operation between Kansas City and Liberty for about eighteen hours, and the section between Liberty and Excelsior Springs was tied up until Friday evening, Feb. 26. The poles carrying the high-tension line fell over the track. Not all the damage was continuous, the longest series of felled wires being about 1½ miles. The other damage was scattered. There was no damage to other equipment or to persons. None of the other interurban railways reported damage to wires or poles, but telephone and telegraph companies in eastern Kansas and northern Missouri suffered heavily.

Decision in New York Labor Case.—During the week ended Feb. 27, the Court of Appeals of New York handed down decisions in the Heim and Crane cases, upholding the constitutionality of the labor law in respect to the provision which forbids the employment of any but citizens of the United States upon contracts for public work. This decision affects practically all of the contracts on the new subways which the city of New York now has outstanding, and which aggregate about $142,000,000. There are thirty separate contracting firms engaged in the work, which employ about 16,000 men. Two days after the decision was published one of the contractors had suspended work and others were proceeding with reduced forces. It is the contention of the contractors that it is next to impossible to procure American citizens to do the kind of work which in the past has been done by foreigners. The contractors, however, have announced that they will obey the law. It was announced on March 1 that the case would be carried to the United States Supreme Court on an appeal on a writ of error from the decision of the New York Court of Appeals. On March 4 the operation of the alien labor law in New York State was suspended by the United States Supreme Court pending the review of the decision of the Court of Appeals declaring the law constitutional.

Financial and Corporate

PRESENT INVESTMENT TREND

Now that banking business and credit facilities have been fairly well restored from a domestic point of view, it is the opinion of A. B. Leach & Company, New York, that the present points of interest are the rapid accumulation of capital on account of business far below normal, and the higher trend of security prices on account of low money rates. This banking house looks for an era of unparalleled business activity at the close of the European War, with an increased demand for capital, higher money rates and security prices at a lower level.

As regards the present returns on securities it is said that 5 per cent has fairly represented the value of money for the last twenty years, and the average investor has been able to loan his funds at this rate. During the last ten years public utility bonds have generally carried 5 per cent coupons. This has had its effect in enlisting the interest of the investor as against 3½ to 4 per cent railroad issues, and the investor today looks upon utility issues as the most satisfactory for his surplus funds. Refunding operations, new financing and higher money rates will exert comparatively little effect on prices of public utility issues; they will even hold their place against offerings of 5 per cent railroad bonds.

KANSAS CITY REORGANIZATION

Federal Court Refuses to Sanction the Plan Proposed for Financial Reorganization

Judge William C. Hook in the United States Court at Kansas City, Mo., listened on Feb. 26 to the arguments of attorneys representing stockholders and bondholders and other creditors, in support of their suggestions for the reorganization of the street railway of Kansas City. The court declined to approve the plan, and the session adjourned with the interested parties still at variance, but with confidence prevailing that some method of reorganization could be devised that would avoid foreclosure.

The plan proposed depended chiefly upon a combination of the electric light company with the Metropolitan Street Railway so that the credit of the former could be available as an unincumbered equity in case of later emergencies. Judge Hook insisted that he would, under no circumstances, consent to any arrangement resembling the operation of a holding company, and that the electric light company and the street railway must be kept separate. The court pointed out that the railway owned power houses, while the light company had none, and that the city, interested under the franchise in only the street railway property, would, if the suggested plan were adopted, want to see as large a revenue for current as possible, while the light company would want to obtain its current as cheaply as possible. If the city should wish to sell power to other concerns besides the light company, it would soon be competing with itself.

The court criticised the efforts of the attorneys to insist upon the union of the light and railway interests. He also intimated that heretofore, and in the proposed plan, the bond and stockholders and noteholders were seeking to take the settlement of the affairs of the companies out of the court's hands, and to protect only their own interests. He said that, under the new franchise, the Kansas City Railways, the new company, must start out free of debt and that many obligations must be taken care of, the creditors in which had not yet been heard from. The court would see that all interests and creditors were protected.

Mayor Jost of Kansas City addressed the court after the opinion was delivered. He insisted on strict compliance with the terms of the franchise. The court asked explicitly if the Mayor would insist on the bonds running the full term of the franchise, and the answer was positive that he would so insist. Both Judge Hook and the Mayor expressed the opinion that no better franchise than that granted was obtainable from Kansas City, and the Mayor added that no other franchise would be considered while he was the city's executive.

ANNUAL REPORTS

United Railways of St. Louis

The comparative statement of income, profit and loss of the United Railways of St. Louis, St. Louis, Mo., for the years ended Dec. 31, 1913 and 1914, follows:

	1914	1913
Revenue from transportation	$12,359,219	$12,612,787
Revenue from operation other than transportation	91,705	89,857
Total operating revenue	$12,450,924	$12,702,644
Operating expenses (depreciation included)	8,644,735	8,573,617
Surplus over operating expenses	$3,806,189	$4,129,027
Taxes	767,794	653,674
Net income from operation	$3,038,395	$3,475,353
Income from other sources	87,901	84,350
Gross income (less operating expenses and taxes)	$3,126,296	$3,559,703
Deductions from income	2,618,255	2,660,673
Net income	$508,041	$899,030
Dividends on preferred stock		
Surplus	$508,041	$899,030

The passenger revenue for the year 1914 was $12,280,581, a decrease of $246,791, or 1.97 per cent, compared with the year 1913. During the first six months of the year the passenger revenue showed an increase of $95,263, or 1.55 per cent, but during the second six months a decrease of $342,-054, or 5.35 per cent. Other revenue from transportation decreased $6,777. Revenue from operation other than transportation increased $1,848, and income from other sources increased $3,551. The gross earnings and other income amounted to $12,538,825, a decrease of $248,169. Total operating expenses (including depreciation) increased $71,-118. The taxes applicable to the year 1914 were $767,794, an increase of $114,120, or 17.46 per cent, of which $112,855 was in favor of the city of St. Louis. The average number of employees in the service of the company during the year was 5500. The amount of money paid in wages was $4,304,408, or 34.57 per cent of the gross earnings.

The total number of passengers carried during the year 1914, as compared with the year 1913, and the car mileage figures in these two years, follow:

	1914	1913
Revenue passengers 5 cents	243,183,207	247,936,404
Revenue passengers 2½ cents	4,856,826	5,222,072
Total	248,040,033	253,158,476
Transfer passengers	127,444,829	123,266,765
Total passengers	375,484,862	376,425,241
Passenger car mileage	44,355,113	42,409,907
Other car mileage	377,536	380,179
Total car mileage	44,732,649	42,790,086

These figures show an increased passenger car service of 1,945,206 car miles, or 4.59 per cent, as compared to the decrease in passenger revenue of $246,791, or 1.97 per cent. The percentage of revenue passengers using transfers during the year 1914 was 51.38, an increase over the year 1913 of 2.69. This large increase in the percentage of transfer passengers was caused by the more generous transfer system put into effect July 1.

During 1914 there was expended and charged to capital account, for added property, the sum of $247,876, as follows: real estate, buildings, tools and fixtures, $27,515; track and roadway construction, $104,549; electric line construction, $61,273; power plant—buildings and equipment, $19,693, and cars and electric equipment of cars, $105,081—less real estate sold, $70,235. During the years 1910 to 1914, inclusive, the company spent on its property $12,-841,652—$1,382,966 for construction and equipment, $7,251,-433 for maintenance and $4,207,253 for reconstruction and replacement charges. The expenditures so made were 23.24 per cent of the gross earnings during the period, which amounted to $55,251,087.

The total mileage of single track on Dec. 31, 1914, was 345.52 miles for city track and 112.67 miles for county track, or 458.19 in all. During the year 1.91 miles of track were added, 5.79 miles were removed, 21.77 miles were reconstructed and 12.69 miles of unpaved track were retied and reballasted. In addition to the regular repair and maintenance work, the following cars and equipment were built:

Sixty-two steel center entrance trailers, one steel bottom motor car (sample design), two motor cars, forty-one combination cars converted into closed cars, 382 cars thoroughly overhauled and converted into the closed rear platform type, and three new work cars. During the year 1690 cars passed through the repair shops for truck repairs, body repairs or painting.

New York State Railways

The statement of income, profit and loss of the New York State Railways, Rochester, N. Y., for the year ended Dec. 31, 1914, follows:

Earnings from operation		$7,595,001
Expenses of operation (including depreciation)		4,600,572
Net earnings from railroad operation		$2,994,429
Taxes		496,659
Net earnings		$2,497,770
Net non-operating revenues		165,466
Gross income		$2,663,236
Income deductions (interest and rentals)		1,355,466
Net income		$1,307,770
Schenectady Railway surplus	$37,985	
New York State Railways proportion 50 per cent		18,992
Ontario Light & Traction Company surplus	$2,453	
New York State Railways proportion 100 per cent		2,453
Total income applicable to dividends		$1,329,215
Dividends preferred stock 5 per cent		193,125
		$1,136,090
Dividends common stock 5 per cent		997,350
Balance		$138,740

The total owned mileage of main track and sidings of the New York State Railways is 439.48 miles, divided as follows: Rochester lines, 227.16 miles; Syracuse lines, 85.5 miles; Utica lines, 114.44 miles, and Oneida lines, 12.38 miles. The total leased mileage is 143.33 miles, separated in this way: Rochester lines, 12.47 miles; Syracuse lines, 9.58 miles; Utica lines, 15.68 miles, and Oneida lines, 105.6 miles (trackage rights only). The total owned and leased is 582.81 miles, but this includes 0.33 miles for a Syracuse line leased but not operated, giving a net figure of 582.48. The total equipment is 1038 cars, divided 554 for the Rochester lines, 253 for the Syracuse lines, 199 for the Utica lines and 32 for the Oneida lines.

The following statement shows the result of operations of the Schenectady Railway for the year ended Dec. 31, 1914:

Earnings from operation		$1,304,303
Expenses of operation		833,372
Net earnings from railroad operations		$470,931
Taxes		84,803
Net earnings		$386,128
Net non-operating revenues		5,683
Gross income		$391,811
Income deductions		107,826
Net income		$283,985
Dividends—6 per cent		246,000
Surplus		$37,985

During the same fiscal year the earnings from operation of the Ontario Light & Traction Company, Canandaigua, N. Y., were $53,980 and the expenses $36,600, leaving net earnings from operation of $17,380. Taxes and uncollectable bills totaled $2,678 and $64 and net non-operating revenues $5,288, so that the gross income resulting was $19,925. After making income deductions of $17,472, there was left a net income of $2,453.

Binghamton (N. Y.), Railway.—The total revenue of the Binghamton Railway for the year which ended Dec. 31, 1914, was $485,430, divided as follows: Passenger revenue, $476,701; chartered car revenue, $945; mail revenue, $416; express revenue, $4,777; advertising revenue, $2,400, and rent of building, $191. The operating expenses of $321,473 were made up of $90,418 for maintenance expenses, $4,881 for traffic expenses, $178,188 for expenses of operation and $47,986 for general expenses. Taxes accrued amounted to $16,200, giving income for railway operation of $147,757. The addition of $12,974 for electric lighting revenue gave an operating income of $160,694. Interest accrued totaled $108,729, making a net corporate income of $51,924. The car-miles operated during the year were 1,974,019, the car-hours 226,127, and the car-seat-miles, 72,616,067. The revenue passengers carried during the year totaled 9,524,652, and the transfers 1,772,147. The company now has 48.26 miles of track.

Chicago (Ill.) Elevated Railways.—At the recent annual meeting of the Metropolitan West Side Elevated Railway, the South Side Elevated Railroad and the Northwestern Elevated Railroad, subsidiaries of the Chicago Elevated Railways, the number of directors in each company was reduced from seven to five. The members elected to the boards are the following: Samuel Insull, Henry A. Blair, Britton I. Budd, William H. Fox and G. H. Gulick.

Columbus Railway, Power & Light Company, Columbus, Ohio.—The Ohio Public Utilities Commission has amended its order of Oct. 15, 1914, so as to allow the Columbus Railway, Power & Light Company to extend its issue of first refunding and extension sinking fund 5 per cent gold bonds to retire the following underlying bonds from time to time as the holders thereof may agree: For the $511,000 of general mortgage 6 per cent gold bonds of the Columbus Light, Heat & Power Company, dated Aug. 1, 1908, $1,100 in face value of the first refunding and extension bonds for each $1,000 of these latter general mortgage bonds; and for the $182,000 of first mortgage 6 per cent gold bonds of the Columbus Public Service Company, dated Feb. 1, 1901, $1,100 in face value of the first refunding and extension bonds for each $1,000 of these latter first mortgage bonds.

Fairmount Park Transportation Company, Philadelphia, Pa.—The reorganization committee of the Fairmount Park Transportation Company on Feb. 26 sent out letters to the stockholders who had assented to the reorganization plan, calling for payment of the second subscription installment of $1 per share by March 15. The first payment of $1 was made at the time the shares of stock were deposited. As noted in the digest of the reorganization plan appearing in the ELECTRIC RAILWAY JOURNAL of Jan. 16 and Feb. 27, the total amount to be subscribed was fixed at $3.50 per share. More stockholders assented than was anticipated, however, and this amount has been cut to about $2.95. The remaining 95 cents will probably be called by Sept. 15. On the 27,174 assenting shares the company will receive about $80,000 in subscriptions.

Gary & Interurban Railroad, Gary, Ind.—In view of the recent defaults in interest, a protective committee of bondholders composed of Dimmer Beeber, president Commonwealth Trust Company, Philadelphia, David Halstead and Morgan J. Saupp is receiving deposits of $400,000 of Gary & Connecting Railway first mortgage bonds. A similar committee, including the same chairman, Edward McLain Waters and Edward B. Wilford, is receiving deposits for the $1,000,000 of Gary & Interurban Railway refunding and first mortgage 5 per cent bonds of 1910. Coupons of Dec. 1, 1914, and Jan. 1, 1915, respectively, are in default. If any financial plan is adopted, dissenting depositors will be given thirty days in which to withdraw, on payment of their share of expenses, not to exceed 2½ per cent on their deposited bonds.

Georgia Railway & Electric Company, Atlanta, Ga.—Charles C. Harrison, Jr., & Company, Philadelphia, have purchased a block of refunding and improvement mortgage forty-year 5 per cent sinking fund gold coupon bonds of the Georgia Railway & Electric Company. The authorization of $160,000 of these bonds by the Georgia Railway Commission to cover expenditures made from Jan. 1 to June 30, 1914, for extensions and betterments was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 28, 1914.

Holyoke (Mass.) Street Railway.—The Holyoke Street Railway has applied to the Massachusetts Public Service Commission for authority to issue $850,000 of twenty-year 5 per cent first mortgage bonds to retire $250,000 of bonds maturing on April 1 and to provide $600,000 for paying floating indebtedness. This proposed bond issue is the initial amount of a bonded debt of $2,500,000 authorized at a meeting of the stockholders on Feb. 17.

Kansas City Railway & Light Company, Kansas City, Mo.—John B. Dennis, chairman of the committee of holders of the 6 per cent notes of the Kansas City Railway & Light

Company, due on Sept. 1, 1912, has announced to the holders of certificates of deposit representing these notes that the company has arranged for the payment on March 1 at the New York Trust Company, New York, of interest on the notes from Sept. 1, 1914, to March 1, 1915, at the rate of 7 per cent per annum.

Lake Shore Electric Railway, Cleveland, Ohio.—The Lake Shore Electric Railway has filed a certificate increasing the authorized capital stock of the company from $7,500,000 to $8,000,000.

Manila Electric Railroad & Light Corporation, Manila, P. I.—A quarterly dividend of 1½ per cent has been declared on the $5,000,000 of capital stock of the Manila Electric Railroad & Light Corporation, payable on April 1 to holders of record March 18. This compares with 1¾ per cent from April, 1913, to Jan., 1915, both inclusive.

Massachusetts Electric Companies, Boston, Mass.—Blake Brothers & Company, Hayden, Stone & Company, and Jackson & Curtis are offering at 98 and interest, to yield about 5.75 per cent, $3,000,000 of 5 per cent gold coupon notes of the Massachusetts Electric Companies. These notes, which are of a par value of $1,000, are dated April 1, 1915, and are due on April 1, 1918. They are issued to take up $3,100,000 of coupon notes due on May 1 and will then constitute the only debt of the company, except current bills payable.

Mexico Tramways, Mexico City, Mexico.—On Feb. 23, U. de B. Daly, secretary Mexico Tramways, announced that owing to the continued unsatisfactory condition of affairs in Mexico the directors had no alternative but to defer the payment of the half-yearly coupons due March 1 on the general consolidated first mortgage fifty-year 5 per cent gold bonds of the company. As previously reported, the Mexican government has taken over the control of the business of the tramways and is receiving the earnings from the operation thereof. The company, therefore, is not in a position to remit the necessary funds to meet the coupons. With a view to protecting the interests of those holding the company's securities, however, representations have been made to the British and United States governments on behalf of the company.

Montgomery Light & Traction Company, Montgomery, Ala.—Howard R. Taylor & Company, Baltimore, are offering at 105 and interest, to yield 5.25 per cent, a block of the $350,000 of Montgomery Street Railway first mortgage 6's of 1893, due in August, 1923. These bonds are a closed first mortgage issue on about 30 miles of electric railway, ranking prior to $1,000,000 of first and refunding bonds of the Montgomery Light & Traction Company, which operates the entire system or street railways and an electric light and power system in Montgomery and suburbs.

New York (N. Y.) Railways.—The amount of interest that is payable upon New York Railways 5 per cent income bonds for the six months ended Dec. 31, 1914, will be submitted to arbitration. The bondholder directors are unwilling to sign the income statement for six months ended Dec. 31, 1914, as recently submitted by the company, and prefer to have the whole matter arbitrated as provided in the mortgage covering the bonds. Under these provisions one arbitrator is chosen by the company, one by the trustee under the mortgage, who is E. S. Marston, president Farmers Loan & Trust Company, and those two choose the third arbiter. Payment on the bonds for the six months ended June 30, 1914, which was 1.288 per cent, was also decided upon by arbitrators.

Petaluma & Santa Rosa Railway, Petaluma, Col.—The Petaluma & Santa Rosa Railway is asking the holders of $217,000 of second mortgage 6 per cent bonds maturing on April 1 to extend the same for two years.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—At a hearing before the California Railroad Commission on Feb. 23 Richard Sachse, chief engineer of the commission, fixed the valuation figures of the San Francisco-Oakland Terminal Railways as follows: Reproduction value—operative properties, $18,959,281; non-operative properties, $4,564,077; total, $23,523,358; reproduction value, less depreciation—operative properties, $16,011,870; non-operative properties, $4,334,844; total, $20,346,714. The reproduction value as found by the engineers is about $32,000,000, and the company's own book total for all its assets is more than $50,000,000. Mr. Sachse testified that the element wherein the greatest difference was found as between his and the company's figures was land. He said the company's book figures were not of much value, because they contained "large intangible or non-existent values."

Springfield Railway & Light Company, Springfield, Mo.—Bodell & Company, Providence, R. I., are offering at par and dividends $750,000 of 7 per cent cumulative preferred stock of the Springfield Railway & Light Company. The stock is redeemable at the option of the company at 115 and dividends. The company has outstanding $2,183,000 of first lien 5 per cent bonds and $1,100,000 of common stock. The company controls the entire street railway, steam heating, electric light and power business in Springfield.

Toronto (Ont.) Civic Railway.—The gross revenue of the Toronto Civic Railway for the year ended Dec. 31, 1914, was $166,994 and the operating expenses $166,087. The total expenditures, including operating expenses, interest and sinking fund charges, were $253,698. On the basis of the 1,097,088 car miles traveled during the year, the revenue per car mile was 15.2216 cents, the operating expenses 15.1389 cents per car mile and the total expenditures 23.1246 cents per car mile. Hence the profit over operating expenses was 0.0827 cent per car mile, while the loss on total expenditures was 7.903 cents per car mile. The number of passengers carried was 9,829,765 and the revenue per passenger 1.6988 cents. The passengers per car mile numbered 8.9598 and the cost of power per car mile 4.7764 cents.

United Gas & Electric Corporation, New York, N. Y.—The United Gas & Electric Corporation has sold (1) to Drexel & Company, Philadelphia, $5,500,000 of three-year 6 per cent gold notes secured by $7,650,000 of its new thirty-year 6 per cent collateral trust sinking fund gold bonds, and (2) to Bertron, Griscom & Company, New York and Philadelphia, and Reilly, Brock & Company, Philadelphia, the remaining $2,350,000 of the $10,000,000 of such thirty-year collateral trust bonds issuable during the life of the notes. The notes are offered at 98½ and interest to yield more than 6.5 per cent. The proceeds are to be used to provide working capital and funds for the payment at maturity of $7,500,000 of three-year 5 per cent secured notes, due on April 1. It is understood that the holders of the maturing notes will be offered the privilege of exchange on a desirable basis.

Utah Securities Corporation, Salt Lake City, Utah.—The Utah Securities Corporation, which, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 27, has, through its subsidiary, the Utah Power & Light Company, assumed formal control of the Utah Light & Traction Company, has deposited with the Guaranty Trust Company, New York, as trustees of its ten-year 6 per cent notes, $500,115 with which to take up on tenders such part of these notes as the money will purchase. In April, 1914, $7,008,000 of the notes were bought at an average price of 84.881, not including accrued interest, and in July $1,151,000 were bought at 84.81 and accrued interest.

Winnipeg (Man.) Electric Railway.—G. V. Hastings has been elected a director of the Winnipeg Electric Railway to succeed Sir William Whyte.

DIVIDENDS DECLARED

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

El Paso (Tex.) Electric Company, quarterly, 2¼ per cent, common.

Frankfort & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Galveston-Houston Electric Company, Galveston, Tex., 3 per cent, preferred; 3½ per cent, common.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Manhattan Bridge 3-Cent Line, Brooklyn, N. Y., quarterly, 1½ per cent.

Manila Electric Railroad & Light Corporation, Manila, P. I., quarterly, 1½ per cent.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan.,		'15	$431,113				
1 "	"	'14	429,018				

ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, MAINE

1m., Jan.,		'15	$22,527	$20,360	$2,177		
1 "	"	'14	22,657	*20,779	1,878		

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Dec.,		'14	$404,808	*$12,045	$392,763	$40,833	$351,929
1 "	"	'13	413,862	*3,897	409,964	29,166	380,797
12 "	"	'14	3,934,453	*116,908	3,817,545	420,000	3,397,545
12 "	"	'13	2,170,411	*85,348	2,087,063	123,062	1,964,000

COLUMBUS (GA.) ELECTRIC COMPANY

1m., Dec.,		'14	$59,937	*$27,603	$32,334	$28,791	$3,543
1 "	"	'13	56,904	*19,446	37,458	25,099	12,359
12 "	"	'14	681,606	*298,335	383,271	324,637	58,635
12 "	"	'13	608,636	*294,652	313,983	272,680	‡77,153

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO.

1m., Dec.,		'14	$278,561	*$151,427	$127,134	$43,463	$83,671
1 "	"	'13	276,016	*168,491	107,525		
12 "	"	'14	3,066,298	*1,886,746	1,179,552	520,438	659,114
12 "	"	'13	3,003,454	*1,939,520	1,063,934		

DALLAS (TEX.) ELECTRIC COMPANY

1m., Dec.,		'14	$186,415	*$96,203	$90,212	$33,390	$56,822
1 "	"	'13	203,917	*118,832	85,085	26,670	58,414
12 "	"	'14	2,208,879	*1,287,660	921,219	370,961	550,258
12 "	"	'13	2,193,500	*1,280,057	913,443	302,971	610,473

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

1m., Dec.,		'14	$55,656	*$31,445	$24,211	$8,773	‡$15,438
1 "	"	'13	55,001	*32,903	22,098	8,244	‡18,724
12 "	"	'14	673,095	*401,932	271,163	101,639	‡169,525
12 "	"	'13	440,442	*270,592	169,850	71,177	‡141,355

EL PASO (TEX.) ELECTRIC COMPANY

1m., Dec.,		'14	$88,387	*$42,957	$45,430	$4,191	$41,239
1 "	"	'13	87,721	*47,452	40,269	4,210	36,059
12 "	"	'14	1,041,792	*575,472	466,321	51,356	‡461,965
12 "	"	'13	886,880	*478,359	408,521	48,015	‡369,741

FORTY-SECOND STREET, MANHATTAN & ST. NICHOLAS AVENUE RAILWAY

3m., Sept.,		'14	$481,951	$237,723	$244,228	$148,028	‡$96,623
3 "	"	'13	477,501	228,662	248,839		‡104,828

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEXAS

1m., Dec.,		'14	$192,136	*$102,226	$89,910	$36,209	$53,701
1 "	"	'13	203,561	*115,341	88,220	36,549	51,671
12 "	"	'14	2,424,120	*1,310,859	1,113,261	441,125	672,136
12 "	"	'13	2,373,066	*1,352,374	1,020,692	421,213	599,479

NEW YORK CITY INTERBOROUGH RAILWAY, NEW YORK, N. Y.

3m., Sept.,		'14	$171,425	$106,795	064,630	$43,063	‡$21,904
3 "	"	'13	160,705	109,372	51,333		‡12,746

NEW YORK & LONG ISLAND TRACTION COMPANY, HEMPSTEAD, N. Y.

3m., Sept.,		'14	$130,708	$81,995	$48,713	$24,549	‡$25,344
3 "	"	'13	126,489	93,345	33,144		‡9,556

NEW YORK & QUEENS COUNTY RAILROAD, NEW YORK, N. Y.

3m., Sept.,		'14	$381,879	$357,422	$24,457	$86,410	††$61,936
3 "	"	'13	383,444	309,464	73,980		††12,503

RICHMOND LIGHT & RAILROAD COMPANY, NEW YORK, N. Y.

3m., Sept.,		'14	$131,555	$93,638	$37,917	$38,121	‡$41,517
3 "	"	'13	131,225	115,193	16,032		‡19,286

SAVANNAH (GA.) ELECTRIC COMPANY

1m., Dec.,		'14	$71,678	*$45,578	$26,099	$23,420	$2,679
1 "	"	'13	74,505	*49,864	24,642	22,967	1,675
12 "	"	'14	842,639	*552,987	289,652	275,333	14,319
12 "	"	'13	827,780	*557,921	269,859	263,264	9,595

SECOND AVENUE RAILROAD, NEW YORK, N. Y.

3m., Sept.,		'14	$260,724	$155,953	$104,771	$65,393	‡$39,377
3 "	"	'13	287,167	165,647	121,520		‡63,356

STATEN ISLAND MIDLAND RAILWAY, NEW YORK, N. Y.

3m., Sept.,		'14	$121,352	$69,244	$52,108	$18,333	‡$33,972
3 "	"	'13	117,975	85,590	22,385		‡14,808

THIRD AVENUE RAILWAY, NEW YORK, N. Y.

3m., Sept.,		'14	$1,005,281	$584,807	$420,474	$612,605	‡$36,577
3 "	"	'13	1,035,830	534,027	501,803		‡87,097

UNION RAILWAY, BRONX, N. Y.

3m., Sept.,		'14	$773,591	$490,896	$282,695	$157,680	‡$132,153
3 "	"	'13	762,489	538,972	223,517		‡74,371

YONKERS (N. Y.) RAILROAD

3m., Sept.,		'14	$194,066	$133,272	$60,794	$49,025	‡$11,904
3 "	"	'13	194,013	123,234	70,779		‡21,490

*Includes taxes. †Deficit. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Trend of Recent Legislation—Companies State Their Attitude—Automobile Man Sanguine

History in regard to legislation covering the operation of buses is being made rapidly. On Feb. 18 the City Commission of Ogden, Utah, passed an ordinance abolishing licenses for automobiles used for carrying passengers where charges for hire were made. Under this ordinance the operation of 5-cent auto buses in Ogden is impossible unless a franchise similar to that of the street railways is granted to the motor-bus operators. On Feb. 17 the City Commissioners of Port Arthur, Tex., passed an ordinance governing the operation of "jitney" cars. That measure places the "jitneys" under bond, and permits their use only on certain streets of the city. The ordinance became operative three days after its passage and on the day that it went into effect the owners of the "jitney" buses decided to discontinue operation. A petition is being circulated asking for a referendum vote on the measure.

On Feb. 19 the City Council of Beaumont, Tex., passed unanimously an ordinance governing the operation of the "jitney" cars. The new measure requires the operators to apply to the City Council for a franchise and makes it an offense punishable by a fine of not more than $200 to operate a "jitney" without a franchise. Up to that date the members of the City Council had not decided on the terms that should be incorporated in the "jitney" bus franchise ordinance. The "jitney" bus ordinance that was passed in Fort Worth, Tex., went into effect on Feb. 22. An effort was made by the operators of "jitney" buses to secure an injunction against the further publication of the ordinance, but the petition was not allowed. Here also a petition for referendum election is being considered. In the Texas Legislature the Mendell bill to regulate "jitney" automobile lines in cities of 10,000 or more has been killed by the committee on judiciary on the ground that under the home rule act cities are empowered to regulate the operation of such transportation lines.

An ordinance regulating "jitney" automobiles was adopted on Feb. 9 by the City Commission of Tulsa, Okla., and is being enforced. The main features of the ordinance are that it prohibits the "jitneys" on streets where street cars are operating, makes them adopt routes and schedules of their own not used by the car lines, and requires them to operate continuously for sixteen hours each day; in other words, to have their own routes and give dependable public service. A conviction has already been secured for violation of this feature of the ordinance. The City Commission of Tulsa took the view that duplication of service was of no advantage to the city, but that they would welcome the "jitney" bus provided operators selected fixed routes and rendered the public proper service by maintaining schedules. As burdens in the way of licenses, assessments, etc., the only fee required is one of $5 a passenger seat a year, with a credit for the regular license charged automobiles, so that in the case of a Ford, for instance, seating four passengers, the extra fee charges is only $5 a year. On March 1 only two "jitney" routes were being operated in Tulsa. They were on streets paralleling the Tulsa Street Railway one block away.

Up to Feb. 24 neither Los Angeles nor San Francisco had taken final action with regard to the traffic measures to regulate the "jitney bus" service. Previous to that date, however, City Attorney Albert Lee Stephens, of Los Angeles, had completed the draft of a proposed ordinance for that city and it was expected that action on the matter would be taken within a few days. The proposed ordinance in the main follows the recommendation of the utilities committee. It contains eighteen sections and approximately 1800 words. The ordinance does not apply to street or interurban railway cars, sight-seeing vehicles, hotel buses, vehicles operated from a fixed stand in the street or from a private or public garage, the destination and route of which are under the direction of a passenger or passengers being carried.

There has been introduced in the Indiana Senate a bill providing that any person, firm or corporation engaged in

the business of transporting passengers for hire by automobile shall constitute a "public utility" and be subject to all the provisions of the utility commission act, and that such person, firm or corporation shall not engage in or continue in such business except under a license granted pursuant to an ordinance which must be passed by the municipality wherein such utility is operating, fixing the terms and conditions and providing for a satisfactory bond, the Public Service Commission to have the right, on petition, to review and modify the term of any such ordinance.

The commissioners of Spokane, who have been considering the matter of the regulation of the "jitney" bus, have decided on the general terms of the franchise which it is likely will be passed in that city. Under the measures as tentatively drawn "jitney" buses will be placed in a class by themselves, required to run over a stated route on a fixed schedule, secure a Councilmanic permit, give a bond of $5,000, have lights in the cars, collect no fares when in motion and allow no riding on the running boards or undue crowding on the cars.

The City Council of San Diego has taken a tack different from that employed in most of the other cities. It is seeking an injunction to prevent the Red Star Auto Line from operating on city streets, claiming that the "jitney" is a common carrier and that it must apply to the city for a franchise to use the streets.

The question of an ordinance to govern the "jitney" bus at Pueblo, Col., having come up, City Attorney Alva P. Adams, in a formal report to the City Council said that while the city could not prohibit the operation of buses it did hold the power to license and regulate the cars in such a manner as to insure the safety, welfare and convenience of the city and its inhabitants. He said he reached his conclusion reluctantly, and that his opinion was at least at variance with what seemed the opinion of certain public organizations in the city and with the conclusions reached upon the subject at Denver.

In the city of Memphis the question of the regulation has been passed on to the city attorney with instructions for an opinion. On Feb. 21 Director of Streets and Sewers Talbert of St. Louis began preparing amendments to the pending taxicab bill to regulate the operation of the "jitney" as a common carrier in that city.

A great deal has been printed about the proposed ordinance to be introduced in the Council of Kansas City. It was said a few days ago that this ordinance would provide for a bond of $10,000 for each car, an occupation license tax of about $5 a car annually and a vehicle tax of $10 a car annually. The bond requirement would compel each "jitney" driver to put up $10,000 security himself, as the bonding companies have refused to assume "jitney" risks.

From all parts of the country come stories of the organization of the "jitney" bus owners and operators for their own protection. Some of these organizations are showing a considerable amount of strength. In one city in Texas the city officials at present holding office were loath to put themselves on record, fearful of the consequences at the impending election.

John N. Willys, of the Willys Overland Automobile Company, and Henry Ford are said to have expressed themselves freely recently in regard to the "jitney" bus. Mr. Ford was quoted in the papers in the East on Feb. 27 as stating that he contemplated putting into service in Chicago Ford cars with a seating capacity of sixteen persons each. Mr. Ford subsequently denied this. Mr. Willys is reported to have said:

"The tremendous political influences exerted by the electric street railway interests may succeed for a short period of time in retarding the sudden and great development of the automobile transportation property known as the 'jitney' bus, but it will never be able to suppress the new and popular means of locomotion. The public in this country is just awakening to the possibilities and advantages of motor transportation. The promise of cheap, satisfactory transportation for the American public has been made possible by the wonderful strides in this country in the construction of good, serviceable automobiles at only about half the price at which they can be produced abroad. This means more to the 'jitney' bus business than might at first be supposed, when one thinks only of first cost or the original investment carried as a fixed charge."

Among the electric railways that have gone on record recently in regard to the 'jitney' are the Louisville Railway, the United Railways of St. Louis, the Georgia Railway & Power Company, the Birmingham Railway, Light & Power Company and the Capital Traction Company. The attitude of the Louisville Railway is discussed in its publication, *Trolley Topics*. The company says:

"Should an attempt be made (to operate 'jitney' buses) they should be regulated in as substantial a way as is the Louisville Railway, in that the rate of fare, the tax to be paid, the route to be followed, should be prescribed; also the routes should be sufficiently long to be a benefit to the riding public and not merely operated in the congested districts, which are already thoroughly covered by street car lines; for, unless so regulated, they can be of no real benefit to any class of citizens, but, on the contrary, would be a detriment to the entire city and cause increased taxation on every citizen in the city. Indeed, it is by no means certain that the 'jitney' buses can be legally operated in Louisville, as it seems there is a city ordinance, which has been in effect for many years, prohibiting the operation of a bus or other vehicle to carry passengers in competition with established street railroads, carrying a penalty of $5 to $50 for each offense."

The article which appeared in the February issue of the *United Railway Bulletin*, published by the United Railways, St. Louis, reviewed the "jitney" situation in general and more particularly the ordinances and regulatory measures which have been adopted in various cities in which the "jitney" has been placed in operation. In conclusion the article said:

"If any evidence of the viciousness of this lack of inspection is needed it is only necessary to tabulate the automobile accidents any Sunday during the summer, when the streets are full of automobiles run by amateur drivers. The street railways pay a large part of their gross earnings as taxes and also are required to maintain the pavement between their rails and tracks. It is hardly likely that the municipalities will allow automobiles conducting a similar business to go free of license and taxes."

J. P. H. de Windt, vice-president and general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., stated the attitude of his company recently to the members of the city commission. He is quoted as having said among other things:

"All I ask is a square deal. I am willing to meet competition any time. I will turn over the books of my company to any member of the commission or to any man of fair principles to show him whether or not we are making any improper profits. The 'jitneys' have cut our gross revenues perhaps $700 a day."

George E. Hamilton, president of the Capital Traction Company, Washington, D. C., in a letter to the Public Utility Commission of the District, protested against "jitney" bus operation without regulation. He said that it was essential for the commission in the true performance of its duties to protect common carriers in the enjoyment of their legal rights and charter privileges, and that the progress and development of the District depended in a considerable measure on the service given by the street railways and the development and betterment of that service. To allow the "jitney" to enter the field as a free lance without franchise, without regulation and without responsibility and compete under such unequal conditions with the street railroad would probably cripple and might destroy a service that was good and dependable. This, he thought, was the last thing that the public utilities commission would desire.

The Georgia Railway & Power Company recently carried in the papers of Atlanta a long advertisement in which it gave seven reasons why Atlanta should proceed in the matter of the "jitney" bus regulation with full thought of future consequences. It said frankly that the company's profits were concerned with the proposed inauguration of the "jitney" buses. In conclusion the company said:

" 'Jitney' buses were novelties. Now the novelty is wearing off. Regulations to control the buses are being shaped in many cities—but with more difficulty than if those regulations had been prepared in advance. Will Atlanta look before she leaps?"

The Fort Wayne *News* of Feb. 20 sounded an editorial

note of caution in regard to the "jitney" bus. The paper said in part:

"The city authorities will do well to go slow, very slow, in the matter of 'jitney' bus lines in Fort Wayne. While justice demands that a corporation that has invested an immense sum of money here be given decent consideration, the claims of the people are, after all, paramount, and it is certain that 'jitney' bus lines are decidedly inimical to their interests. There always has been fault-finding—most of it captious—and there always will be, yet we all know that the street car is a pretty dependable proposition and that its management is responsible. It is really a pretty good thing to have about the municipal house. The same cannot be said, however, for the owners of the 'jitney' buses whose operation increase the probability of accidents to passengers and pedestrians fourfold. These people are practically irresponsible in a financial way. The 'jitney' bus has no proper place in our social economy."

The Puget Sound Traction, Light & Power Company, operating in Seattle, estimates from January business that it will carry 20,736,000 fewer passengers in 1915 than it hauled in 1914, if the competition of 5-cent motor buses continues unabated. The company has placed stub cars on the outer portions of the suburban lines, transferring passengers to downtown cars.

In Tucson, Ariz., "jitney" drivers have been arrested under the old "hack stand" ordinance. Injunction proceedings are threatened. E. N. Sanderson, New York, president of the Federal Light & Traction Company, protested against the operation of the "jitneys."

The special "jitney" service feature is being used more generally in Kansas City with large passenger cars, the charge being 10 cents, however, and the machine gathering its passengers from hotels and apartment houses for boulevard rides downtown. The use of automobiles is being welcomed by residents of suburban districts as the solution of their transportation problems in respect to lines where street railways would not be profitable for several years to come.

T. F. Grover, general manager of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, took the "jitney" bus for his subject at the regular monthly meeting of the employees of the company on Feb. 24. His remarks were published practically in full in the Terre Haute *Star* and by the other daily newspapers in Terre Haute. He has had the statement printed in pamphlet form. He replied in his remarks to the questions of the effect of the "jitney" on the future of the company, whether there would be a war between the company and the "jitney," and what effect the "jitney" would have on the city of Terre Haute should it continue to operate under present conditions. He included in his remarks a very interesting summary of the cost of "jitney" operation. On Feb. 18 there were about seventy-five "jitneys" in operation in Terre Haute, while on Feb. 25 Mr. Grover estimated that there were not more than fifteen in operation.

HEARING IN INDIANAPOLIS-LOUISVILLE I. C. C. CASE

A supplemental hearing was held at Indianapolis on Feb. 23 and 24 before Examiner Fleming of the Interstate Commerce Commission on Interstate Commerce Commission docket No. 5217, originally brought in the name of the Louisville Board of Trade vs. Indianapolis Columbus & Southern Traction Company, et al, in the matter of through freight service between Louisville and Indianapolis. As a result of the original hearing the Interstate Commerce Commission ordered that through freight service be established between Louisville and Indianapolis and intermediate points, which service was instituted on Sept. 15, 1914. The participating carriers, the Interstate Public Service Company, Indianapolis & Louisville Traction Railway, Louisville & Northern Railway & Light Company and Louisville & Southern Indiana Traction Company, were, however, unable to agree on the basis of divisions of the resulting revenue, and finally the Louisville & Northern Railway & Light Company petitioned the commission for a supplemental hearing for the purpose of having the basis of divisions of freight revenues fixed by the Interstate Commerce Commission. A great deal of testimony was introduced bearing upon the equitable division of freight earnings, and many traffic managers of Indiana interurban lines appeared before Examiner Fleming. As there are still a number of briefs and arguments to be filed with the commission, it is probable that three or four months will elapse before any decision will be handed down.

CHICAGO SERVICE QUESTIONS

Several points to be considered in seeking relief from congestion in the Chicago downtown loop district were brought out by L. A. Busby, president of the Chicago Surface Lines, at the recent hearing before the Illinois Public Utilities Commission. Mr. Busby stated that the basis for calculating the regular rush-hour schedules was eighty passengers to each car seating fifty-two persons. He considered it advisable to allow about 3½ sq. ft. for each passenger after deducting reasonable space for entrances, exits and the car crew. It should be borne in mind that the physical capacity of certain lines in the downtown district was greatly exceeded during the rush hours by the number of passengers demanding service and that the problem of meeting the labor agreement has to be taken into consideration. He laid stress on the relief that could be obtained by the immediate elimination of teams from the tracks in the loop district. Relief could not be secured through the use of trail cars, as their operation on lines passing through the loop was prohibited under the present franchise ordinance. Mr. Busby expressed the opinion that the public would object to the walk which would be involved if the present downtown terminals of the surface lines were changed by turning back cars before they reached the center of the business district. The police would be impotent to enforce service standard regulations such as obtain in some foreign cities.

While before the commission R. F. Kelker, Jr., city traction supervisor, submitted a plan for rerouting cars in the Chicago loop district in order to reduce the number of double-track crossings and thereby speed up schedules. Under the present routing there are twenty-five double-track crossings in the loop district, and if Mr. Kelker's plan was adopted this number would be reduced to the equivalent of six double-track crossings by turning back east and west lines at Clark Street, or at a point where they would not intersect the heavy north and south lines.

SERVICE STANDARD ORDINANCE

The local transportation committee of the City Council of Chicago, Ill., with the aid of the Bureau of Public Service and Prof. E. W. Bemis, the city's representative on the Board of Supervising Engineers, has drafted a service standard ordinance. In preliminary form this ordinance requires that all lines must operate on a written schedule, a copy of which must be filed with the commissioner of public service in Chicago. In case schedules are changed the revisions must be submitted to the commissioner of public service at least three days before the new schedules are put into effect. All cars are required to carry run numbers which will fix their position in the schedule, and extra cars are also to be indicated.

The non-rush-hour service standard requires that the aggregate number of seats within the cars passing any point in any one direction shall not be less than the aggregate number of passengers carried during any period of fifteen consecutive minutes. It is provided, however, that if less than three cars of any line or lines pass any point at which a check is made during the fifteen-minute period, then the aggregate number of seats carried by three consecutive cars passing in any one direction shall not be less than the aggregate number of passengers carried. The service standard also requires that at no time or place on any line operating within the city of Chicago shall there be scheduled less than one car during each twenty-minute period of the entire twenty-four hours, the four hours between 1 a. m. and 5 a. m. being excepted. The right to designate checking points is retained by the commissioner of public service, who is required to notify the railway company of its location. Exceptions are made in cases where it is physically impractical to comply with the standard of car loading, or where the elements interfere, but the burden of proof is on the railway. A fine of $200 for each violation of this ordinance is included.

SAFETY ARTICLES FOR SCHOOL CHILDREN

In connection with a systematic and permanently-organized safety movement the Chicago & Joliet Electric Railway, Joliet, Ill., has prepared a set of twenty printed articles with the assistance of the superintendent of the city schools and heads of the city departments. These articles were written for children of different ages and vary in length from 300 to 750 words. J. R. Blackhall, general manager, and W. H. Heun, superintendent transportation and claim agent of the company, have experienced no difficulty in obtaining the co-operation of the parochial and public school teachers and superintendents in the distribution of these leaflets. They are given to the teachers in sets, each set being contained in an envelope appropriately indexed. The titles follow: "Meaning of Safety"; "Fire Facts by the Fire Chief"; "Health and Happiness"; "Suggestions by Chief of Police"; "Danger from Live Wires"; "Keep on the Sidewalk"; "Keep Away from Wagons and Automobiles"; "Trolley Cars are Dangerous"; "Better Safe Than Sorry"; "Help Others"; "Dangerous Fun"; "Be Thoughtful" (for younger children); "Thoughtfulness" (for older children); "Those Who Seek Excitement Court Danger" (for older children); "The Cruel Giant"; "Ed's Mishap"; "The Safety Button Soliloquy"; "Safety Everywhere"; "First Aid"; "Fair Play."

DEALING WITH THE SPITTER

Officers of the Louisville & Interurban Railway and the county health authorities have agreed upon a plan by which they hope to help keep down disease and improve the appearance of the cars on the several electric lines running out of Louisville, Ky. In future when conductors or motormen of the company remonstrate with those who spit in the cars they will speak with authority, for they will be State officers, with the titles of sanitary inspectors. The officials of the company have been exerting themselves to keep down the filthy practice, and they readily assented to the plan when it was suggested by the health authorities.

When a conductor or motorman discovers a passenger violating the law against spitting he will fill out a blank which he will carry and which will rank as a legal notice. These blanks will be handed to the violators and warn them that repetition of the offense will mean arrest, the train men being empowered, even charged, to swear out warrants so providing. The names of all the trainmen on the cars running out of Louisville have been furnished to the State board of health and the appointments are to be issued immediately. The Louisville & Interurban Railway and the Louisville Railway are co-operating with the health authorities, city, county and State.

Accident Record in Louisville, Ky.—The Louisville Railway has carried a total of 417,449,000 passengers and the Louisville & Interurban Railway 17,812,000 since there has been a fatal accident to any of their passengers.

Mileage Books Discontinued.—The Cortland County Traction Company, Cortland, N. Y., has announced that the sale of interchangeable ticket or mileage books at $10 per book will be discontinued after April 1. Books outstanding after that date will be honored in accordance with the terms and conditions under which they were sold.

Service Hearing in St. Louis.—The final hearing before the Public Service Commission of Missouri in connection with the inquiry into the adequacy of the service of the United Railways, St. Louis, was held in that city on Feb. 24. Henry S. Priest and Morton Jourdan represented the company as counsel. Each side has been given ten days in which to file briefs.

Testimony Completed—Testimony has practically been completed in the arbitration proceedings which have been under way for some weeks, involving the differences between the Kentucky Traction & Terminal Company and the union trainmen. F. W. Bacon, vice-president of the company, was the last witness for the company, after which rebuttal testimony was offered by the union. Arguments are to be heard in conclusion by Charles C. Bagby, Danville, the umpire.

Safety Work to Continue.—The Ontario Safety League will continue its work in 1915. The officials hope to be able to take up the question of industrial safety and co-operate with employers of labor in an endeavor to reduce accidents in factories, workshops, etc. The help of the General Ministerial Association was enlisted on Feb. 22 when a deputation appeared before the association and asked for its assistance in forwarding the objects of the league. The association has arranged for an announcement to be made in the churches of Toronto to bring the matter before the whole public.

Welfare Work in New York.—H. H. Vreeland, director of welfare of the Interborough Rapid Transit Company and the New York Railways, has contributed to the February issues of the magazines published in the interest of the emplolyees of the companies reviews of the work of his department as it relates to each company. He says the work reflects progress, reveals the wisdom of the officials in thus co-operating with the employees and sustains the most sanguine expectations of both officials and employees. The figures which are included in the reviews are especially significant of the activities carried on.

Toronto Civic Fares.—The proposal to increase the fare on the civic railway lines in Toronto, Ont., has been revived by Alderman McBride. The plan has the support of Works Commissioner Harris, who suggests selling nine tickets for 25 cents. The present charge of 2 cents or six tickets for 10 cents is not sufficient to make the system self-supporting. On Feb. 26 the works committee of the City Council adopted the recommendation of Commissioner Harris to increase the cash fare to 3 cents, with nine tickets for 25 cents. An amendment to make it ten tickets for 25 cents was voted down, seven to five.

Safety Council at Columbus.—On Feb. 26 Columbus Council No. 19, National Safety Council, was organized at Columbus, Ohio. Thirty representatives, superintendents and safety directors of local industries were present, including those from the Columbus Railway, Power & Light Company. Victor T. Noonan, safety director of the Industrial Commission, said that, through educational work, the accidents in the State may be reduced 50 per cent. E. E. Watson, actuary of the commission, spoke on the economic phases of the work. Secretary Babbitt of the Columbus Railway, Power & Light Company explained the results of the safety work that has been done by his company.

Welfare Work in St. Louis.—The pamphlet report of the United Railways, St. Louis, Mo., for the year ended Dec. 31, 1914, contains the following reference to the welfare work of the company: "The Employees' Mutual Benefit Association, which was started in February, 1914, has proved a great success. On Dec. 31, 1914, the association had 3247 members, and during the eleven months of its existence paid out in sick benefits $19,212, and in death benefits $5,100. Nothing which the company has ever done has been of so much benefit, and nothing has brought about such close relations between our employees and the company as the institution of this association. We propose to put into effect in the year 1915 a pension system for aged and incapacitated employees, and also a savings and loan association for the benefit of those employees who wish to save their money, or build or purchase homes of their own."

Health Commissioner Seeks to Fix Car Capacity.—On March 1 Commissioner of Health Goldwater of New York affirmed his intention of strictly inforcing his order limiting the number of passengers to 150 per cent of the seating capacity of the Fifty-ninth and Eighty-sixth Street cars. He also announced that similar orders affecting several Brooklyn car lines will soon be issued. Dr. Goldwater said in part: "If the Board of Health is compelled to take its case into court we shall be able to present not only the testimony of our own inspectors but that of numerous citizens who have volunteered to join us in the effort to obtain their rights, and we shall keep right on until we get results. The order issued by this department, largely because of its unprecedented character, has aroused varied comment and has given rise to some misunderstanding. It is to be observed that the order is not general, but relates to specific nuisances which the railroad companies are requested to abate." On March 2 the New York Railways obtained a stay of the order of the Board of Health until March 16. A public hearing will be held on March 15.

Personal Mention

Mr. A. M. Nanton has been elected vice-president of the Winnipeg (Man.) Railway to succeed Sir William Whyte.

Mr. A. T. Davidson has been appointed purchasing agent of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., to succeed Mr. Lewis Keim.

Mr. C. Nesbitt Duffy, vice-president in charge of operation of the Manila Electric Railroad & Light Company, Manila, P. I., has been elected vice-president of the Manila Merchants' Association.

Mr. John S. Moore, formerly assistant traffic manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., has been appointed traffic manager of the company to succeed Mr. W. O. Woodward, resigned.

Mr. Lewis Keim, who has been purchasing agent of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., for the last four years, has been appointed general inspector of the company, with duties corresponding to those of the position of assistant general manager.

Mr. C. T. Chapman, whose resignation as traffic manager of the Interurban Railway, Des Moines, Ia., was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 27, was the guest of honor at a banquet of the traffic men of Des Moines on Feb. 23. Mr. William Clapper, who has succeeded Mr. Chapman, was also present.

Gen. George H. Harries, who was recently elected president of the Omaha Electric Light & Power Company, Omaha, Neb., and who continues to serve as president of the Louisville Gas & Electric Company, Louisville, Ky., will in the future take active charge of the Omaha property and devote only a portion of his time to the Louisville property, according to an announcement made by H. M. Byllesby & Company, Chicago, Ill., by which company both of these properties are controlled.

Mr. Charles L. Henry, president and general manager of the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., was elected president of the Central Electric Railway Association at the annual meeting held in Indianapolis on Feb. 25 and 26. Mr. Henry was educated as a lawyer. He became interested in railways in 1891, when he purchased the horse car line in Anderson, Ind. Under his direction the line was electrified. In 1897 Mr. Henry built an electric railway from Anderson to Alexandria, which in the year following was extended to Summittville. This was the first interurban line in Indiana and became a part of the Union Traction Company of Indiana when that organization was formed in 1899. Mr. Henry, as general manager of this company, constructed the lines from Muncie to Indianapolis via Anderson. Several years ago Mr. Henry sold out his interest in the Union Traction Company and interested himself in the Indianapolis & Cincinnati Traction Company. Mr. Henry was born on a farm in Hancock County, Ind., on July 1, 1849, and received his education in the common schools, in the literary department of Asbury (now De Pauw) University, and graduated from the law school of Indiana University in 1872, practising law in Pendleton and Anderson until he began his connection with the electric railway industry. Mr. Henry served in the Indiana State Senate from 1881 to 1885, and as a Representative in Congress from 1895 to 1899. He was made fourth vice-president of the American Electric Railway Association in 1911, third vice-president in 1912, second vice-president in 1913 and first vice-president in 1914. Mr. Henry is credited with having been the pioneer builder of interurban electric railways in Indiana and with having originated the word "interurban," as applied to electric railways.



C. L. HENRY

Mr. C. S. Banghart, who has been elected second vice-president and a director of the Binghamton (N. Y.) Railway in addition to general manager, became connected with the company as general manager on Aug. 1, 1914. Previous to that he had been superintendent of the New York & Queens County Railway, operating about 75 miles of electric railway in Long Island City and elsewhere in the Borough of Queens. He was appointed to that position in 1908, having served for five years previously as master mechanic of the company. In all Mr. Banghart has been engaged in electric railway work about twenty-five years. His first position was with the line department of the Allentown & Bethlehem Traction Company. After leaving that company he entered the service of the Thomson-Houston Company during the electrification of the Union Railway, New York. On the completion of that installation he became connected with the M. A. Greene Engine Company, Altoona, Pa., with which he remained about eighteen months. Mr. Banghart then accepted the position of chief electrician with the Flushing & College Point Railway & Lighting Company, with which he remained until he was appointed master mechanic of the Union Traction Company, Reading, Pa. He was with that company from 1895 to 1903 and then accepted the position of master mechanic of the New York & Queens County Railway. The Binghamton Railway operates 31 miles of line and controls the Scranton & Binghamton Railroad which has under way the construction of an electric railway to connect Binghamton with Scranton, Pa.



C. S. BANGHART

Mr. F. L. Fuller has been elected president of the Binghamton (N. Y.) Railway to succeed Mr. G. Tracy Rogers, resigned. Mr. Fuller was formerly, up to 1909, president and general manager of the New York & Queens County Railway, Long Island City, N. Y., and before taking charge of that property was general manager of the United Power & Transportation Company, which controlled electric railway and light properties in the neighborhood of Philadelphia and Wilmington, Del. Mr. Fuller entered street railway work in 1888 as foreman of the Selby Avenue Cable Line of the St. Paul City Railway. The following year electricity was installed in St. Paul and Mr. Fuller acted as assistant superintendent. On the consolidation of the St. Paul and Minneapolis systems in 1893, Mr. Fuller became connected with the West Chicago (Ill.) Street Railway as assistant superintendent. The Chicago company's system was then divided between cable and horse lines, and in 1894 the work was begun of equipping the horse lines with electricity, with Mr. Fuller as superintendent. In 1899 Mr. Fuller became connected with the United Power & Transportation Company, Philadelphia, going from there to Long Island City.

OBITUARY

Edgar Allen, the founder and chairman of Edgar Allen & Company, Ltd., London, England, died at Sheffield on Jan. 28. He was seventy-seven years of age.

Col. N. H. Heft, formerly head of the electrical department of the New York, New Haven & Hartford Railroad, is dead. Colonel Heft had for years been the electrical expert for the company and it was under his supervision that the Nantasket Beach line was equipped with the third-rail, the first application of its kind in the United States. Colonel Heft had been president of the Bridgeport (Conn.) Traction Company, the Greenwich Tramway, the Meriden Street Railroad, and the Stamford Street Railroad. He was formerly president of the Bridgeport Board of Trade. He had not been active in electric railway work for a number of years. In 1901-02 Mr. Heft was second vice-president of the American Street Railway Association. He also presented several papers before that association on heavy electric traction subjects.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Richwood-Hamilton Traction Company, Hamilton, Ohio.**—Incorporated in Ohio to build an electric railway between Richwood and Hamilton. Capital stock, $10,000. Incorporators: Eugene Purtelle and others.

McConnellsburg & Fort London Railway, McConnellsburg, Pa.—Chartered in Pennsylvania to build a 9-mile electric railway between McConnellsburg and Fort London. Capital stock, authorized, $60,000. Incorporators: Edward J. Post, D. H. Patterson, George A. Harris and B. C. Lamberson. [E. R. J., Feb. 6, '15.]

FRANCHISES

Fresno, Cal.—The Railroad Commission has issued an order approving a lease between the Fresno Traction Company and the Southern Pacific Company, by which the latter company will operate the traction company's line from Muscatel Station eastward, a distance of 8.1 miles.

Webster, Mass.—Worcester & Webster Street Railway has asked the Council for a franchise in Webster.

Worcester, Mass.—The Worcester Consolidated Street Railroad has received a franchise from the Council to extend its tracks on Adams Street in Worcester to the site selected for the new distributing station.

Cleveland, Ohio.—The Cleveland Railway has received a franchise from the Council to extend its double track line in Clark Avenue from the intersection with West Sixty-fifth Street thence in West Seventy-third Street to its intersection with Denison Avenue in Cleveland.

Columbus, Ohio.—Philip B. Gaynor, New York, president of the East Linden Electric Railway, has made application to the Columbus City Council for franchises for two new routes. One of them would extend north from the intersection of Joyce and Leonard Avenues to the corporation line and thence to Linden. The other would begin at the terminus of the present Leonard Avenue line and pass through the village of Shepard to the west bank of Alum Creek. The latter line would be a competitor of the Columbus, New Albany & Johnstown Railway, on which the fare between Columbus and Shepard is 15 cents. It is understood that Mr. Gaynor proposes to make the fare 5 cents, which would probably be added to the fare on the lines of the local company to reach the central portion of the city. [E. R. J., Jan. 6, '15.]

Columbus, Kenton & Toledo Traction Company, Kenton, Ohio.—Surveys have been completed by this company over 88 miles of its line between Columbus and Findlay. No definite plans have been made when construction will be begun. This 138-mile line will connect Columbus and Toledo. J. W. Caine, Kenton, vice-president. [E. R. J., Aug. 16, '13.]

Toronto, Ont.—The Eastern Ontario Electric Railway has asked the Ontario Parliament for an extension of time on its franchise to build its line from Toronto to Cornwall via the counties along Lake Ontario. The Board of Control is opposed to granting the extension of time to the company.

Portland, Ore.—The United Railways has filed an acceptance of the provisions of a franchise granted on Feb. 10, 1915, by the Council, for the construction for a line along Front Street and in North and South Portland. By the terms of the franchise the company will remove its tracks on Stark Street in Portland.

Phoenixville, Pa.—The Phoenixville, Valley Forge & Strafford Electric Railway has received a franchise from the Council to lay tracks across Gay Street Bridge in Phoenixville, but only under certain conditions.

Collegeville, Pa.—The Perkiomen Traction Company has received a renewal of its franchise in Collegeville from the Council. This is part of a plan to build an electric line from Collegeville to Schwenkville and vicinity. [E. R. J., Jan. 23, '15.]

TRACK AND ROADWAY

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.—Work has been begun by this company raising its tracks on North Fourth Street between Town Creek and the Southern Railway in Gadsden.

***Buffalo, Ark.**—G. T. Uplegraff, Helena, and Phillip DeWolf, Bristol, R. I., are considering plans to build an electric railway from Buffalo to Yellville, via the Buffalo River. Power would be secured from the Buffalo River. This line would furnish transportation to all the zinc mines in the Buffalo River zinc district.

Lone Pine Utilities Company, Big Pines, Cal.—Work on the construction of the trackless trolley up Swarthout canyon by this company will be begun soon, according to Manager Denton, who is getting ready to put a force in the mountains to finish the project started last spring. The right-of-way for the power line has been secured. The line will be 9 miles long from Grava, on the Santa Fé, south and southeast up the canyon to Lytle Creek, where the company has a tract. It is stated that $50,000 will be spent on the project during the coming months. It is planned to have it completed before the opening of the summer season. [E. R. J., Feb. 28, '14.]

Northern Electric Railway, Chico, Cal.—Plans are being made to rebuild the section of this railway between Meridian and Colusa recently damaged by floods. One abutment of a steel bridge crossing the Sacramento River was carried away and 3 miles of track washed away. The cost of repairs will be approximately $50,000.

Humboldt Transit Company, Eureka, Cal.—Right-of-way is being secured by this company for an extension around the bay to Arcadia and out on Mad River bottom in Arcata.

Fresno (Cal.) Interurban Railway.—During the next six weeks this company expects to award contracts to build 6½ miles of electric railway from Barton to Clovis. Also 1½ miles of new track in Fresno.

Marin County Electric Railway, Mill Valley, Cal.—Contracts will soon be awarded by this company to build the Cascade Canyon unit of this railway. [E. R. J., Feb. 13, '15.]

San Francisco (Cal.) Municipal Railway.—Mayor Rolph has signed a resolution of the Board of Supervisors directing that the Church Street municipal railway be constructed according to plan No. 9. This plan provides that between Eighteenth Street and Twentieth Street the railway shall extend through Mission Park, and that a right-of-way shall be acquired for it through private property between Twentieth Street and Twenty-second Street in San Francisco.

Stockton Terminal & Eastern Railway, Stockton, Cal.—This company has requested authority to issue $319,500 of bonds to be used in completing its line to Jenny Lind, Calaveras County. The company asks, if the commission should not grant its application in full, that it be allowed to sell sufficient bonds to construct 2 miles of railway in order to reach certain gravel beds, from which it is expected considerable traffic can be secured.

Connecticut Company, Bridgeport, Conn.—Work on the new line from Hollister Avenue, Bridgeport, Conn., to Lordship Manor will be begun soon. The first work to be done will be the erection of five new bridges. The Fred T. Ley Company, which has the contract for the laying of the tracks, expects to begin the work on the railway as soon as the weather permits.

Washington Railway & Electric Company, Washington, D. C.—Formal notice was given this company recently that its application for permission to issue bonds to cover certain improvements, including the building of an extension on Fourteenth Street from F Street to Pennsylvania Avenue, will be considered by the Public Utilities Commission. The total amount of the issue for which authority is sought is $207,000. In addition to the Fourteenth Street improvement, the bonds will provide for placing under ground electric connections of the Anacostia line, between Anacostia Bridge and Talbert Street, and an extension of the line on Nichols Avenue. The commission also notified the company that it will consider an application for bonds to cover certain expenditures for equipment authorized by Congress and the orders of the commission.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—Work will soon be begun by this company on the extension on Twenty-second street to the ball park at Coffee Pot Bayou in St. Petersburg.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.—Improvements of its lines in Augusta are being planned by this company.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Preliminary arrangements are being made by this company to build its line between East St. Louis and Harrisburg, via Belleville, Duquoin, Herrin and Johnston City. [E. R. J., Feb. 20, '15.]

Lee County Central Electric Railway, Lee Center, Ill.—Possible early extensions planned by this company include a branch northerly to Ashton or Rochelle or DeKalb and a branch southwesterly to Princeton, Ill.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—This company has awarded the contract to the Allen Engineering Company to make the surveys for the proposed electric railway from Peoria to Chillicothe via Mossville and Rome, and terminating at the Santa Fé Railroad depot in North Chillicothe. Work will be begun at once on this line. Among those interested are: Arthur C. Black, E. A. Mitchell and E. V. Mattice.

Rockford & Interurban Railway, Rockford, Ill.—Plans are being considered by this company to build a new bridge over Rock River in Rockford.

Lafayette & Northwestern Railway, Lafayette, Ind.—Surveys are being made and construction will be begun in April on this line to connect Lafayette and Chicago, via Rensselaer, Hammond, Princeton, Round Grove and West Point. It is stated that contracts are about to be closed for 250,000 ties for the line. O. L. Brown, general manager. [E. R. J., Nov. 7, '14.]

Keokuk, Ia.—Preliminary work on the proposed Keokuk, Ia., to Jefferson City, Mo., interurban railway is progressing. This line will extend to Argyle where connections with the Santa Fe Railroad will be made direct to Keokuk. At Melrose this railway will turn south into Missouri territory, and cross the Des Moines River at Francisville. H. W. Knight and Thomas Pettersen, Chicago, are interested. [E. R. J., Nov. 21, '14.]

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—During the next two weeks this company will award contracts to build 23 miles of new track. It also expects to build a 1500-ft. steel bridge and a 1200-ft. pile trestle.

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next few weeks this company plans to build 1 mile of new track in Manhattan.

***Louisville, Ky.**—A syndicate of Louisville, Jeffersonville and Glasgow, Ky., men have purchased the property of the Olympian Springs Hotel Company, in Bath County, and the plans for improvement include the construction of a 3-mile electric railway to connect the hotel and the Chesapeake & Ohio Railroad. G. W. Armes, who will be manager of the property, said that an Eastern syndicate is considering the plan to build the lines and that the construction would probably begin this spring or early summer. M. H. Thatcher, Dr. Armes, John P. Haswell and J. T. Doores, Louisville; Frank A. Best, Jeffersonville, Ind., and William Henry H. Jones, Glasgow, are the proposed incorporators of the projected company, which is to be capitalized at $200,000.

Southwestern Traction & Power Company, New Iberia, La.—Plans are being considered by this company to build a 12-mile line between New Iberia and Jeanerette.

New Orleans Railway & Light Company, New Orleans, La.—The new South Claiborne Avenue and Broadway line of this company in New Orleans has been placed in operation.

Shreveport (La.) Traction Company.—Work has been begun at once by this company on the extension of the Fairfield line from the present terminus at a point a few blocks beyond King's highway to Delaware Street in Shreveport, a distance of 1 mile.

Saginaw-Bay City Railway, Saginaw, Mich.—During the next few weeks this company will award contracts to build a ½-mile extension of its tracks in Saginaw.

***Benton Harbor, Mich.**—Plans are being considered to build an electric railway to connect Benton Harbor, Sister Lakes and Keeler and later to extend it to Paw Paw. Among those interested are: Henry D. Deam, Charles Sutherland, Sister Lakes, and N. Simpson, Jr.

***Libby, Mont.**—Amos L. Thompson, one of the directors of the First State Bank of Libby, is reported to have stated that plans are under way to build an electric railway from Spokane to Kalispell by way of Kootenai valley.

New York & Long Island Traction Company, Brooklyn, N. Y.—This company is asked to consider plans to double-track its line on the Rockaway Road and Rockaway Turnpike from Broadway, Ozone Park, to City Line, at Rosedale, a distance of 7 or 8 miles. The line extends from the Brooklyn city line to Freeport, in Nassau County.

Buffalo & Depew Railway, Depew, N. Y.—During the next few weeks this company expects to award contracts to build about 2 miles of extensions. It will also award contracts for 200 30-ft. and 35-ft. poles and 4000 6-ft. x 8 ft. ties.

Grand Forks (N. D.) Street Railway.—During the next two weeks this company expects to award contracts to build about 1 mile of new track in Grand Forks.

Cleveland, Alliance & Mahoning Valley Railway, Cleveland, Ohio.—The extension of this railway between Newton Falls and Warren will be completed and ready for operation by April 1.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—The tracks of this company have now reached a point within the corporate limits of Athens, Ohio. When ready for operation on this end of the line there will be a complete connection between Nelsonville and Athens.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio.—Since the City Council of Findlay has granted a franchise that this company will accept, an announcement has been made that the company will spend $116,000 in Findlay upon its property during the coming summer. New rails, ties and other changes will be made on the city line to cost $38,000, while the company's share of repaving the streets will cost $48,000.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—This company has purchased 22 miles of 3/0, figure-8 trolley wire to be installed in a two-wire electric line between Willoughby and Nottingham on its Shore Line Division.

Cushing (Okla.) Traction Company.—This company is now operating about 17 miles of its line between Cushing and Drumright and has construction work under way for the electrification of 17 miles of steam track between Drumright and Jennings. Frank Brown, Independence, president. [E. R. J., Dec. 19, '14.]

Toronto, Ont.—Bids are desired until March 16 by T. L. Church (Mayor), chairman Board of Control, for furnishing material for the Lansdowne Avenue line in Toronto as follows: (a) track material, Contract "A" (rails, plates, bolts, spikes, etc.); (b) overhead line material Contract "B" (wire, fittings, etc.); (c) oak ties, Contract "C."

Toronto, Ont.—The new car line on Bloor Street from Dundas Street to Quebec Avenue in Toronto has been placed in operation. Plans are being contemplated to extend this line to Jane Street in Toronto.

Conestoga Traction Company, Lancaster, Pa.—Surveys have been completed by this company for a new 13-mile branch which will be an extension of the Lancaster & Coatesville division. The new line will begin about a mile east of Conestoga Park, near Mellinger's Church, follow the old turnpike to the Horseshoe Road, and along it to Witmer, from which place it will cross the country to Bird-in-Hand, and thence along the old Philadelphia turnpike to Intercourse.

Pennsylvania & Maryland Street Railway, Elk Lick, Pa.—This company is building a new steel bridge across the Elk Lick Creek in Elk Lick.

Montoursville (Pa.) Pass Railway.—During the next few weeks this company plans to rebuild its bridge on park section in Montoursville.

Carolina, Greenville & Northern Railroad, Greenville, Tenn.—Contracts will be awarded on May 1 by this com-

pany to build an electric line from Kingsport southwest to Newport, 75 miles. There will be five steel bridges on the line. H. S. Reed, 205 Grant Building, Los Angeles, president. [E. R. J., Jan. 30, '15.]

SHOPS AND BUILDINGS

Boston & Worcester Street Railway, South Framingham, Mass.—This company is preparing plans for the construction, at an early date, of a new carhouse and a large repair shop. It has not yet been decided definitely just where these new buildings will be located.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission, First District, has approved the proposed award by the New York Municipal Railway Corporation for the construction of nine stations on the Sea Beach line to Post & McCord, Inc., the lowest bidders, for $331,163. The Sea Beach line is a reconstructed four-track railroad, which will join the Fourth Avenue subway at Sixty-fifth Street, Brooklyn, and extend from there to Coney Island. The reconstruction of this line is about completed, with the exception of the stations, tracks and other equipment. The stations to be constructed are at Eighth Avenue, Fort Hamilton Avenue, New Utrecht Avenue, Eighteenth Avenue, Twentieth Avenue, Twenty-second Avenue, Kings Highway, Avenue U and Eighty-sixth Street.

Oklahoma Interstate Railroad, Miami, Okla.—This company has opened an office in Miami.

POWER HOUSES AND SUBSTATIONS

United Railroads of San Francisco, San Francisco, Cal.—This company will add to its substation equipment a 1500-kw synchronous converter, three 525-kva transformers and switchboard ordered from the General Electric Company.

Arkansas Valley Railway Light & Power Company, Pueblo, Col.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 150-kva, single-phase, thirty-cycle, 22,000-volt high tension, 460-volt low tension outdoor O. I. S. C. transformers.

Danbury & Bethel Street Railway, Danbury, Conn.—This company will place in operation in its power house a new 937-kva Curtis turbo-generator and has awarded the contract to build and install the unit to the General Electric Company.

Morris County Traction Company, Morristown, N. J.—During the next few weeks this company expects to build a new substation. Machinery for this structure has already been contracted for.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—This company recently purchased a new, all-steel, portable substation with complete electrical equipment from the Westinghouse Electric & Manufacturing Company to replace its Ashtabula substation which was destroyed by fire. The electrical equipment includes a stepdown transformer and a 300-kw, 650-volt rotary convertor.

Toronto (Ont.) Suburban Railway.—This company's new substation at Thistledown, which has been in course of erection for several months, has now been completed and will be in operation in a few days. The station was built in connection with the extension of the railway to Woodbridge. A telephone system of dispatching the cars has also been installed.

Carbon Transit Company, Mauch Chunk, Pa.—During the next six weeks this company expects to purchase substation equipment including two 300-kw, sixty-cycle, rotaries with transformers, etc., to convert 11,600-volt, three-phase to 600-volt direct current for railway work.

Scranton & Binghamton Railroad, Scranton, Pa.—During the next four weeks this company expects to build a new substation at Foster, Pa. It plans to purchase transformers for its power plant to step up the voltage to 66,000 for transmission.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 300-kva, three-phase, sixty-cycle, 11,400-volt high tension, 440-volt low tension, O. I. S. C. transformers.

Manufactures and Supplies

ROLLING STOCK

Scranton & Binghamton Railway, Scranton, Pa., has ordered four cars from The J. G. Brill Company.

Binghamton (N. Y.) Railway has ordered twenty double-truck cars from the Cincinnati Car Company, through W. R. Kerschner, its eastern agent.

Consolidated Street Railway, Cottonwood Falls, Kan., expects to purchase within the next twelve weeks one storage-battery car complete.

New York State Railways, Rochester, N. Y., has issued specifications for forty prepayment center-entrance cars for its Rochester lines.

Fresno Interurban Railway, San Francisco, Cal., expects to purchase within the next six weeks one suburban and one interurban passenger car.

Manhattan City & Interurban Railway, Manhattan, Kan., will purchase six open bench trailers and about two or three good second-hand, single-truck motor cars.

Wilkes-Barre & Hazleton Railway, Hazleton, Pa., has issued specifications, through L. B. Stillwell, consulting engineer, New York, N. Y., for ten all-steel interurban cars.

Carolina, Clinchfield & Ohio Railway, Johnson City, Tenn., has purchased from the McKeen Motor Car Company one 40-ft. 200 hp gasoline motor concrete mixing car for lining tunnels.

Chicago, Waukegan & Fox Lake Traction Company, Chicago, Ill., has purchased one 55-ft. 200 hp combined passenger-baggage gasoline motor car from the McKeen Motor Car Company.

Empire United Railways, Syracuse, N. Y., is considering the purchase of ten light interurban cars. Specifications have not yet been issued. It is reported that the company is also contemplating the purchase of about eighty additional cars at a later date.

Chicago & Milwaukee Electric Railway, Highwood, Ill., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 2, 1915, as expecting to buy fifteen cars, has ordered this equipment from The J. G. Brill Company. The cars will be all-steel. The railway company retains an option of ordering fifteen more cars of the same type.

Yonkers (N. Y.) Railroad will soon go into the market for some new cars, probably a large-sized order. The Third Avenue Railway's new radial axle car was tried out in Yonkers recently and was operated very successfully on the steep hills with which the city abounds. Quite likely this will be the type ordered.

Boston & Worcester Street Railway, South Framingham, Mass., will probably order within a few days six closed and six open cars, twelve trucks and electrical equipment for same, to replace the eleven open cars and one closed car which were destroyed in its recent Westboro carhouse fire. E. P. Shaw, general manager of the company, advises that the railway may possibly decide to purchase good second-hand open cars instead of new cars, if the former are available in first-class condition.

TRADE NOTES

The J. G. Brill Company, Philadelphia, Pa., has received an order for forty auto buses from a concern in Chicago.

Quasi-Arc Company, New York, N. Y., dealer in Quasi Arc weldtrodes and electric welding accessories, has removed its offices from 111 Broadway to 61 Broadway.

Ed. Elson, of the Walter A. Zelnicker Supply Company, Universal Iron & Supply Company and the Zelnicker Crayon Works, St. Louis, who formerly made his headquarters in New Orleans, La., is now making his headquarters in Chicago at the Hotel Morrison.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, announces that it has again been awarded the exclusive gear and pinion contract for the Stone & Webster Engineering Corporation, this being the fourth year that the Stone & Webster companies have purchased tool steel gears and pinions under contract.

Sangamo Electric Company, Springfield, Ill., has received an order from the Pullman company for several thousand ampere-hour meters. This is the second large contract between the two companies for this type of meter. As rapidly as possible each and every Pullman sleeping and parlor car is being equipped with these ampere-hour meters to control the battery charge by the method developed by Ernest Lunn, chief electrician of the Pullman company.

General Electric Company, Schenectady, N. Y., has received orders for the following equipment: Norfolk & Bristol Street Railway, four GE-200, 40-hp four-motor car equipment; Chicago & Joliet Electric Railway, four GE-240-hp four-motor car equipment; Pacific Electric Railway, twenty-four GE-254, 135-hp four-motor car equipment; Empire United Railways, Syracuse, N. Y., twelve GE-200 40-hp two-motor car equipments and twelve straight air-brake equipment; Metropolitan Street Railway, Kansas City, Mo., fifty 50-hp, four-motor car equipments and fifty control and air-brake equipments; Sheboygan Railway & Electric Company, Sheboygan, Wis., two GE-247, 35-hp, four-motor car equipments; two CP-25 straight air-brake equipments and four GE-201 60-hp motors.

William Wharton, Jr., & Company, Inc., Philadelphia, Pa., now a subsidiary to the Taylor-Wharton Iron & Steel Company, are building a new and extensive plant at Easton, Pa., having begun work about June 1 last. The plot of ground on which the plant will be situated comprises fifty acres and is located just west of the city of Easton, with direct connections with both the Lehigh Valley Railroad and the Central Railroad of New Jersey, through which five other railroads entering Easton are reached. Nearly ten acres will be under roof when all the buildings are completed. The main shop, which will be devoted entirely to the manufacture of special track work for electric railways and steam railroads, will be more than 450 ft. square, consisting of seven bays and one cross-bay, and one bay for storage of supplies and partly finished material. Other buildings are the power house, a fine office building, a foundry for both steel and iron castings, a large pattern shop with laying-out floor and a forge shop. The Wharton company expects to combine the business of its present Philadelphia plant and Jenkintown plant at the new works, and in the forging department the business in all kinds of steel and iron forgings of the Tioga Steel & Iron Company, another subsidiary of the Taylor-Wharton Iron & Steel Company will be handled. The works will be equipped throughout with the most modern and improved machinery for the purpose. The plant will be in operation early next summer. As it is within 20 miles of the large foundry plant of the Taylor-Wharton Iron & Steel Company at High Bridge, N. J., where are made all the manganese steel castings for the special track work manufactured and sold by Wm. Wharton, Jr., & Company, a concentrated organization is possible.

ADVERTISING LITERATURE

Zelnicker Crayon Works, St. Louis, Mo., has issued a folder on its railroad crayons.

Keystone Varnish Company, Brooklyn, N. Y., has issued a catalog describing its washable linseed oil paint for interior painting.

Railway Supply & Curtain Company, Chicago, Ill., has issued a folder describing its car curtains, curtain fixtures, curtain rollers, vestibule curtains, vestibule curtain fittings, and curtain material.

Stow Manufacturing Company, Binghamton, N. Y., has issued a catalog describing its combination of flexible shaft and electric motor for drilling, grinding, buffing, die-sinking and screw-driver work.

Thew Automatic Shovel Company, Lorain, Ohio, has issued a catalog describing its electric railway shovels. The catalog contains illustrations of the shovel in actual operation in St. Louis, Cincinnati, Indianapolis and Cleveland, and also includes data on the results obtained.

Street Railway Signal Company, Inc., Philadelphia, Pa., has issued a catalog which describes and illustrates its contactor signal for either single or double track. These signals, "Model E," are of the all light trolley-contact operated type, having the three-position aspect for single track opposing protection, but permitting following movements. The catalog shows photographs of installations of these signals on several electric railways, including the New York & Queens County Traction Company, Wilkes-Barre (Pa.) Railway and Terre Haute, Indianapolis & Eastern Railway.

Railway Improvement Company, New York, N. Y., has issued a very attractive and clearly-planned book entitled "The Clock Trust." The book contains a series of pages which show the brakeshoe, power and coal savings effected by twelve prominent electric railways, through the use of coasting recorders supplemented by the system of inducing motormen to use current economically by offering rewards and by ranking them. The book also includes reproductions of letters which contain operating engineering data on the saving of coasting recorders on about thirty different railways.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Catalog No. 22 which describes its type AR single-phase motor, in sizes of ½, ¾, 1, 1½, 2, 3, 5, 7½ and 10 hp for 60-cycle circuits, 110 and 220 volts, This motor is designed for starting heavy loads with minimum starting current. It starts as a repulsion motor and operates as an induction motor with constant speed characteristics. It is constructed for hard service under severe operating conditions, especially where the starting current must be kept at a low value. The company has also issued a catalog on its electric fans and data sheets on its current-limiting reaction coils and cam limit switches.

Cambria Steel Company, Johnstown, Pa., has issued a catalog describing its "Slick" steel mine ties for mine and industrial railroads. These ties are of rolled steel section, combining light weight with sufficient strength. The necessary rail fastenings, which consist of flanged buttons, are always in place, ready for use and cannot become lost or misplaced. The fastening buttons are adapted to be turned with comparative ease by means of an ordinary adjustable or solid wrench. One of the greatest advantages of the tie as used in mine room is due to the fact, illustrated by photographs in the catalog, that it is only ½ in. high, as compared with a wooden tie, which is at least 3 in. in height.

General Electric Company, Schenectady, N. Y., has issued as a supplement of the *General Electric Review* a remarkably beautiful reproduction of two pages which were included in resolutions, contained in highly artistic book form, of appreciation on the occasion of the retirement of C. A. Coffin and the election of E. Wilbur Rice as president of the company. These resolutions were adopted at the twenty-ninth annual convention of the Association of Edison Illuminating Companies, Cooperstown, N. Y., 1913. The resolutions express deep appreciation of the constructive thought and effort of Mr. Coffin in furthering the development of the electrical industry, and tender congratulations to Mr. Rice on his appointment as a well-deserved recognition of his abilities and service.

Graphite Lubricating Company, Bound Brook, N. J., has issued an unusually complete catalog on the subject of oilless bearings, which have special application as trolley wheel bushings for electric cars. As stated in a chapter in the catalog entitled "The Story of the Trolley Wheel Bushing" this company received its first order for twelve trolley bushings in 1889. It is now producing over a million per year. A remarkable instance of wearing quality is shown by an illustration of a trolley bushing which was recently returned to the company by the Colorado Springs & Interurban Railway, Colorado Springs, Col. This particular bushing, still in fine condition, had been removed from a worn-out 4-in. trolley wheel, after having run 27,633 miles. The catalog also contains ample testimony as to the excellent service of the "Bound Brook" bushings when used in connection with various other types of machinery.

The following significant editorial comment on the attitude of the Georgia Railway & Power Company in connection with the "jitney" bus appeared in the Charleston (S. C.) *News and Courier:*

"Incidentally, the plan taken by the street car people of arguing this matter out with the public on its merits is significant of the new attitude of capital in such matters. Such a move even ten years ago would have been regarded with amazement. Now it is accepted as a matter of course."

Traffic Direction Block System of automatic signaling for Electric Railways



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This system is especially designed for the operation of interurban railroads. It combines the maximum of safety and efficiency with the least amount of apparatus.

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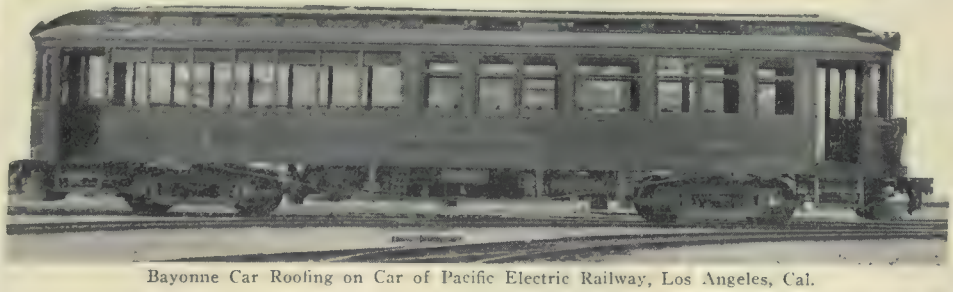
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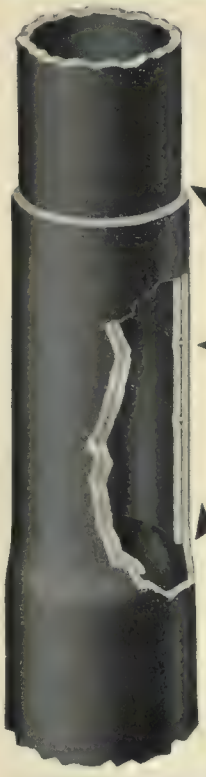
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Make a note:

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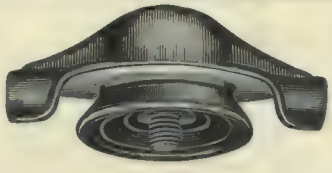
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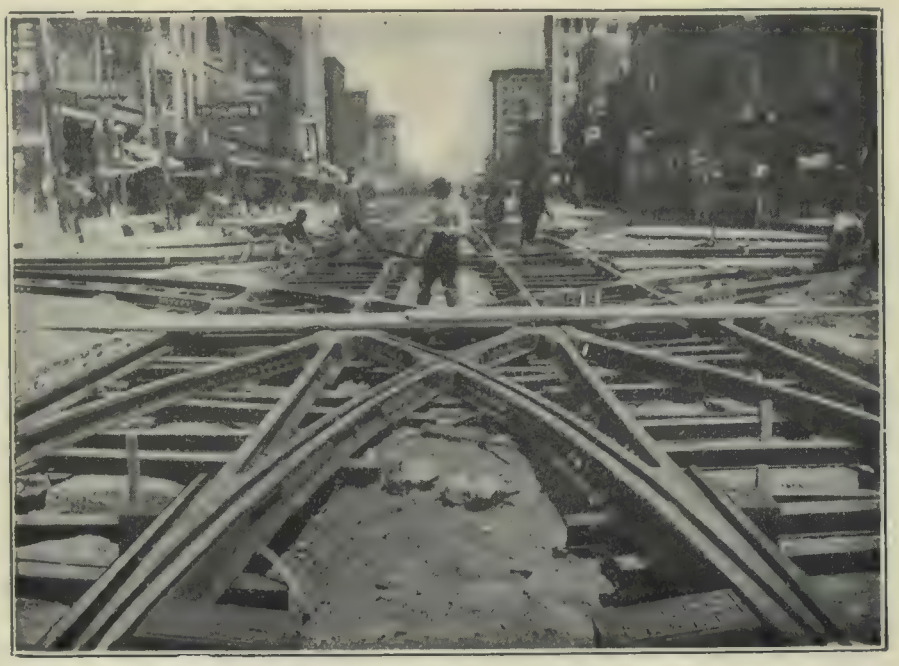
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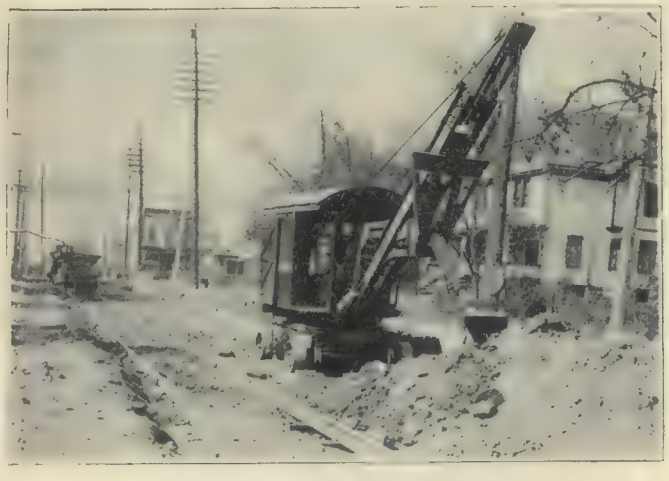


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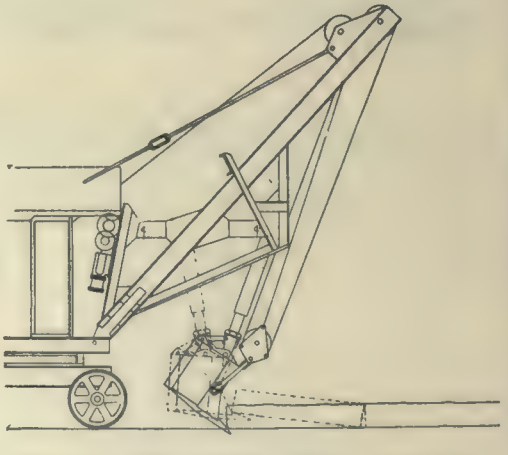
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Introduction of economies are always desirable, especially where they are combined with efficiency, as in the case of steel ties.

By their use economy is reflected through your various departments.



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Shallow cuts—removal of old macadam for track laying—grading work in close quarters—tearing up old track, etc.—these are your problems. The Thew is designed especially for such work. *The horizontal crowding motion of The Thew* cuts clean and true to grade—does the work quickly and cheaply.

Used on old macadam or concrete foundations, the *crowding motion* is *reversed* to apply a *powerful prying motion.*

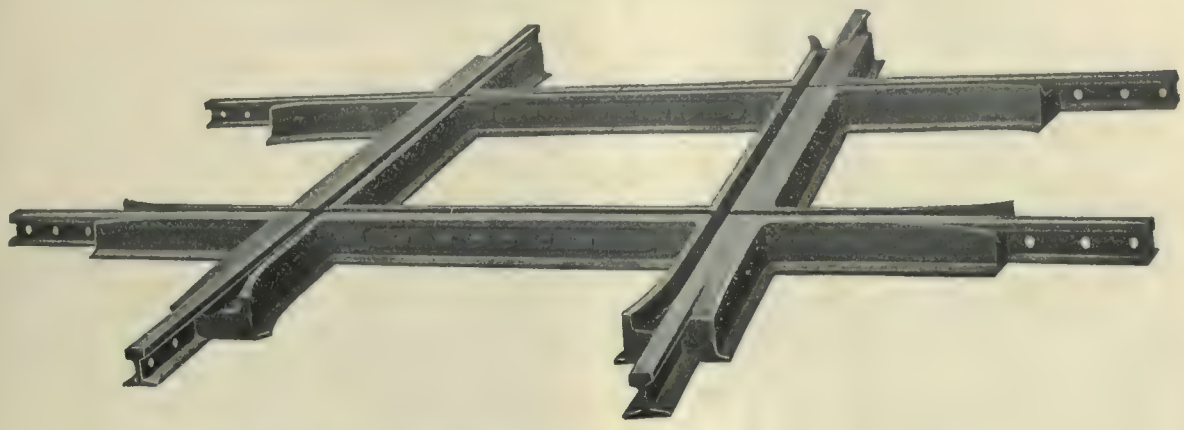
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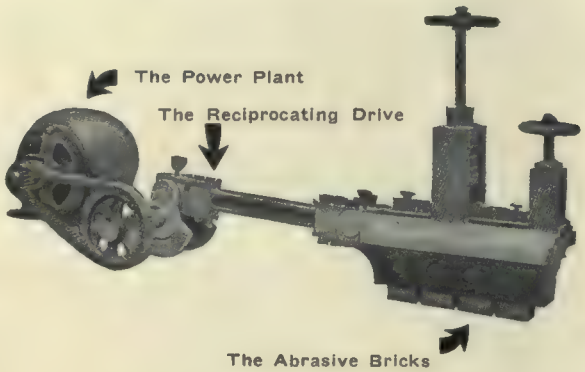
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That describes the motion of the Reciprocating Track Grinder.

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3 men can make 6 joints in 10 hours

We have an inexpensive outfit that will enable you to make your own compromise joints at a great deal lower cost than the mechanical or cast joint, and make them in a jiffy.

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It's a heavy-bodied combination of grease and graphite that is easily applied and covers a great deal of track.

The graphite content identifies itself with the metal of the rails and will not wash off or dry up and blow away, or melt and run off.

This graphite film gives lubrication that saves tractive power, stops curve noises and reduces the wear on rails and wheel flanges.

No system of street railway operation on economical lines is complete which does not use this highly efficient and economical curve grease.

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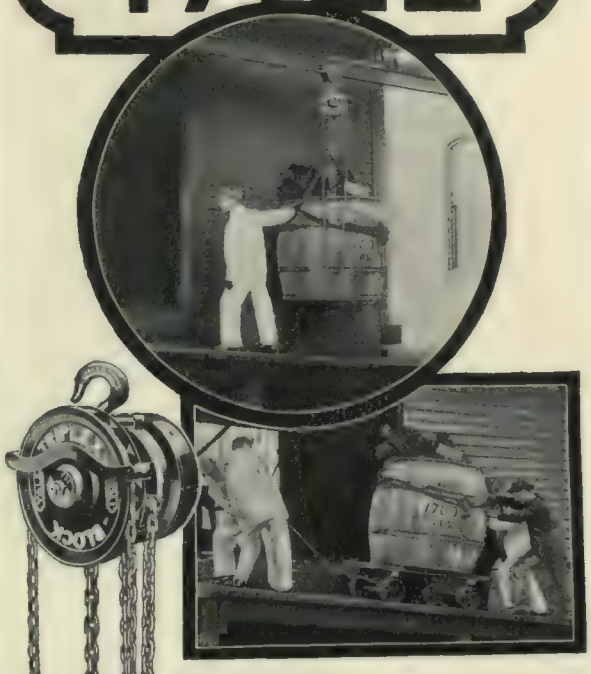
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First in safety,
First in value,
First in efficiency,
Standard in price,
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Some of the reasons why the Yale Triplex Block is the leading hoist are: steel parts, wrought steel suspension plates, electric welded steel chain, long ton rating, greatest overload test.

Ask for the book "A YALE DEVICE THAT LAUGHS AT GRAVITY." It will make your hoisting problems easier.

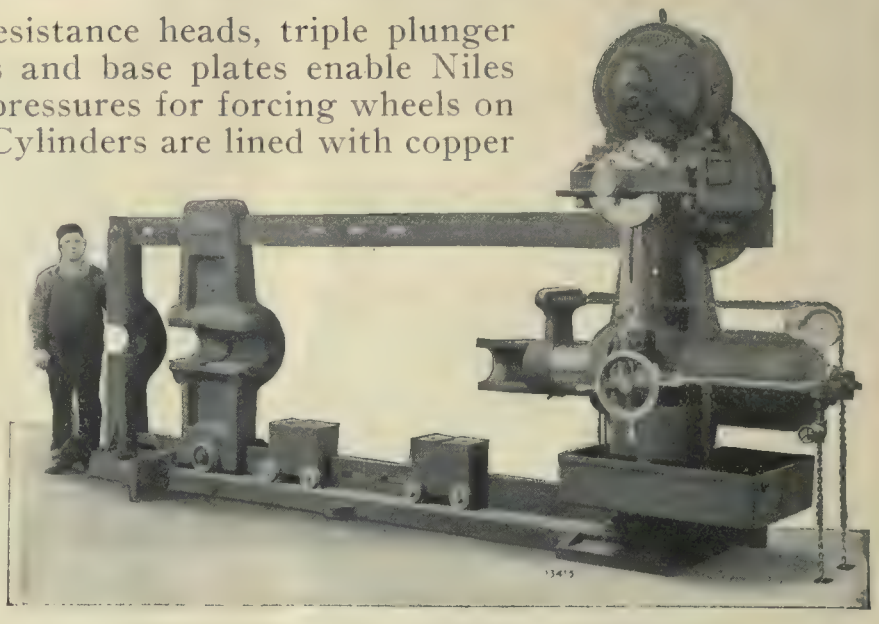
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All three plungers may be worked simultaneously or one or two thrown out giving variety of pressures up to maximum.

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48-INCH, 300-TON NILES HYDRAULIC CAR-WHEEL PRESS.

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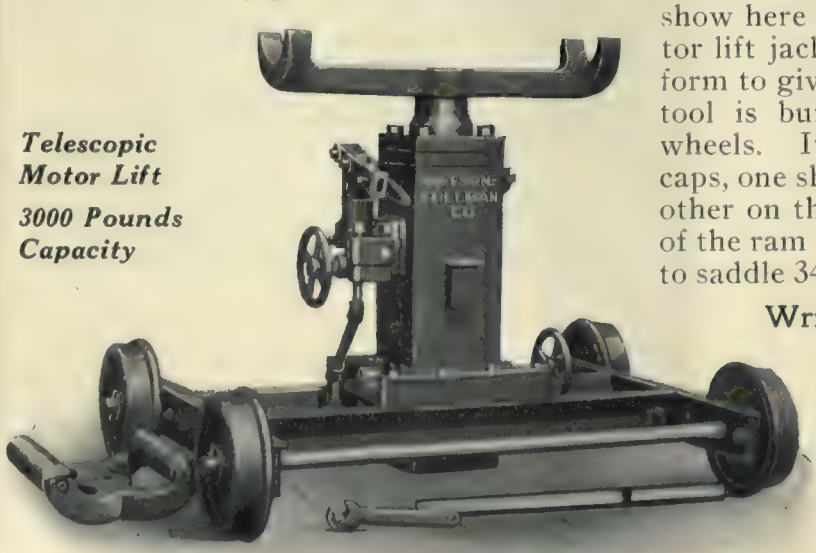
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We build a large line of hydraulically operated tools for railway shop use, including jacks, pit jacks, motor lifts, battery lifts, shaft straighteners, pipe benders, rail benders, rail bonders, punches, shears, etc. We show here one of these tools, a motor lift jack, built in telescopic ram form to give close clearances. This tool is built with flanged or flat wheels. It is equipped with two caps, one shown on machine and the other on the floor. The movement of the ram is 42 in.; height from rail to saddle 34 in. when closed.

Telescopic Motor Lift

3000 Pounds Capacity



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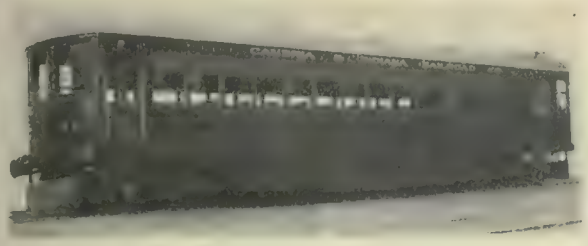
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Electrical equipment supplied by the Railway Storage Battery Car Co. Car body built by the J. G. Brill Co.

This 29½ Ton Storage Battery Car

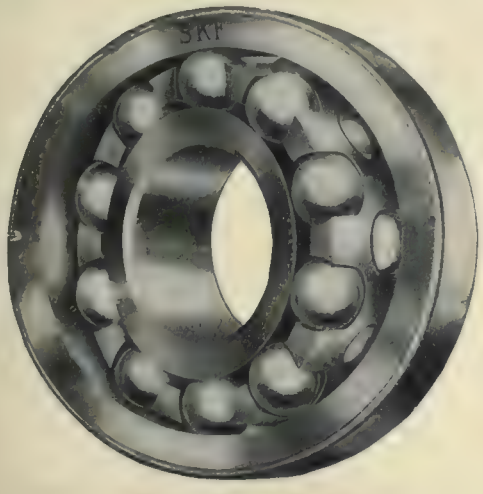
covers a range of 130 miles on a single normal battery charge. These figures show the unusual mileage per charge possessed by the new storage battery car recently put in service by the Cambria & Indiana Railway. The car has an extra powerful storage battery and—

it's equipped with

SKF BALL BEARINGS

They contribute particularly to the operating economy of the car. This fact can be easily demonstrated by facts and figures from S. K. F. service records. Let us quote to save *you* money. Write.

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Clear and Black Baking Varnishes for armature and field coils and for transformer and magnet coils where high insulation is required.

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Electrical Compound for switchboards, junction boxes, underground cables, etc.

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Perry Ventilators for your rush-hour crowds



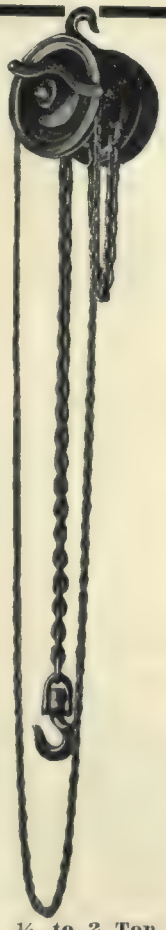
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PERRY VENTILATOR CO., New Bedford, Mass.

SALES MANAGER

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211



¼ to 2 Ton Tribloc Hoist

The Easy-Running Chain Hoist is the FORD TRIBLOC

It has planetary gearing (which is enclosed in a dust-proof steel case), steel parts, a 3½-to-1 factor of safety in its weakest parts, and eighty per cent. of the power applied to the hand chain is converted into lifting energy.

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The chains and hooks used on the Ford Tribloc are of the best material and workmanship procurable, and all our claims are backed by a five-year guarantee.

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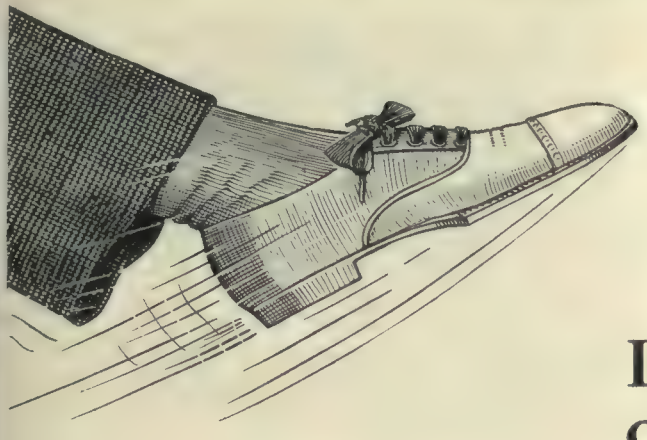
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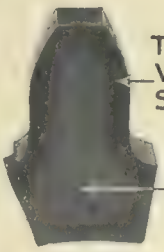
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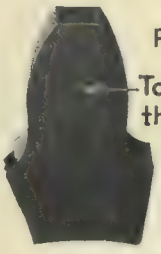
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The Allis-Chalmers 3 Air Compressor

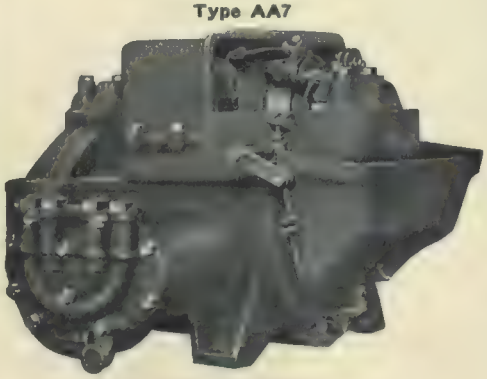
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Weighs 390 (425 with cage) as compared to 850 lbs.
Height is 14 inches as compared to 25 inches

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Type AA7



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FOR ALL CLASSES OF SERVICE



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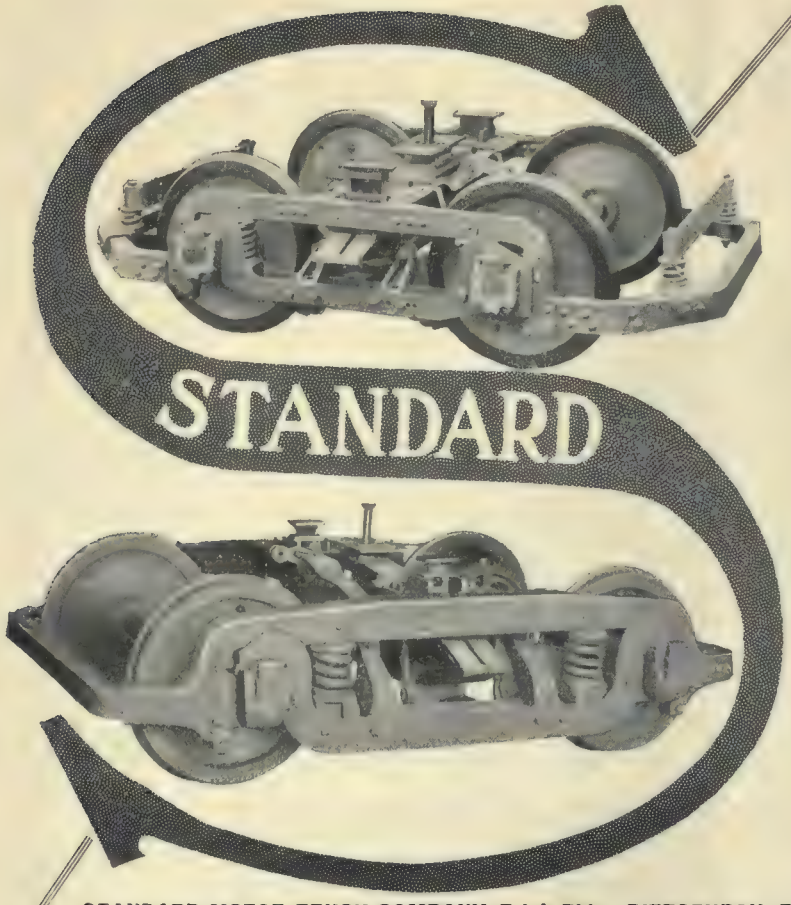
The plates of the wheel are made of a soft strong metal that will successfully withstand the shocks of strains and service.

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For Safe, Long-time Service

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Frames solid forged without welds, i.e., made from one continuous bar of open-hearth steel. Carrying capacity 50,000 pounds at king pins. 34" Forged Steel wheels, 3¾ x 7" M.C.B. journals. Brake shoes hung on the equalizer bars (thus insuring uniform wearing of brake shoes). All wearing holes steel-thimbled and bolts case-hardened. This truck is used throughout the New England cities, New York, Detroit, Toledo, Oklahoma City, Seattle, Jacksonville, Kansas City, San Francisco, Cincinnati, Indianapolis and many other cities.

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Taylor Electric Truck Co.

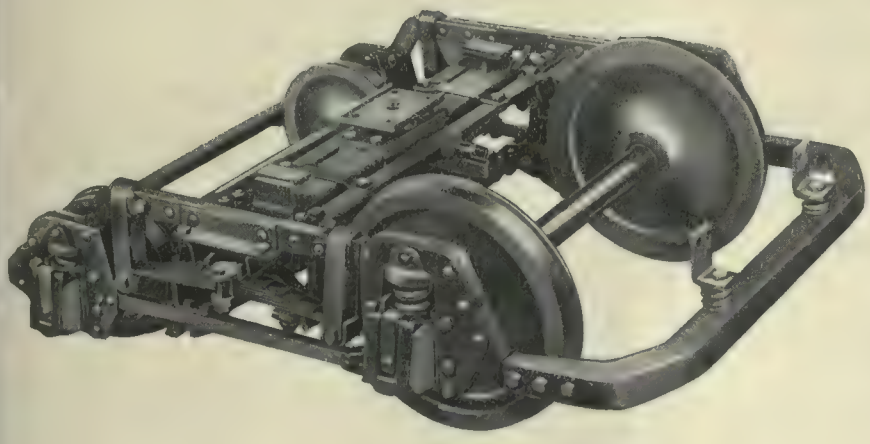
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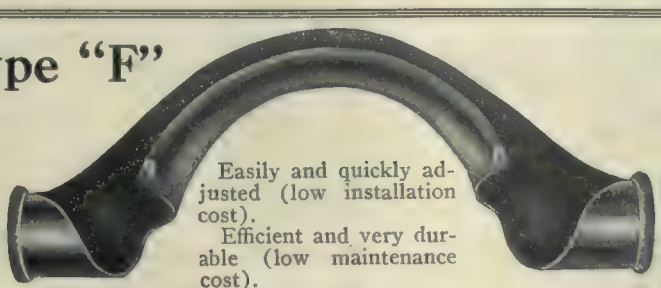
Standard Underground Cable Co.
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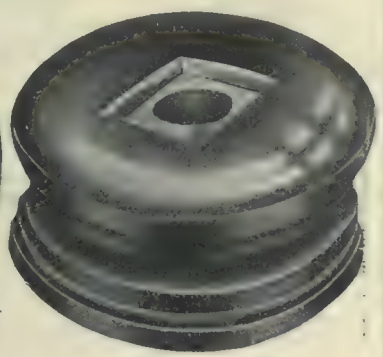
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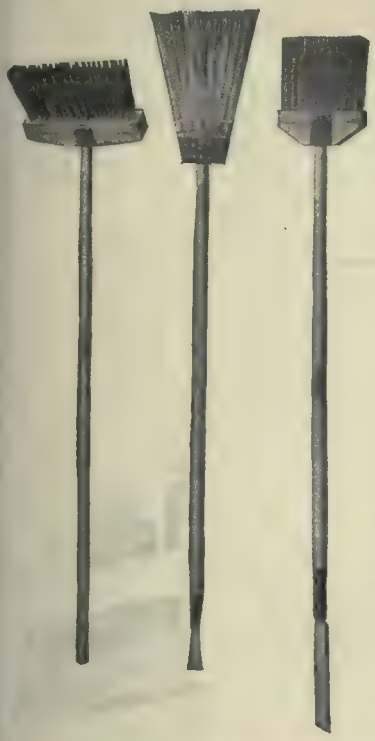
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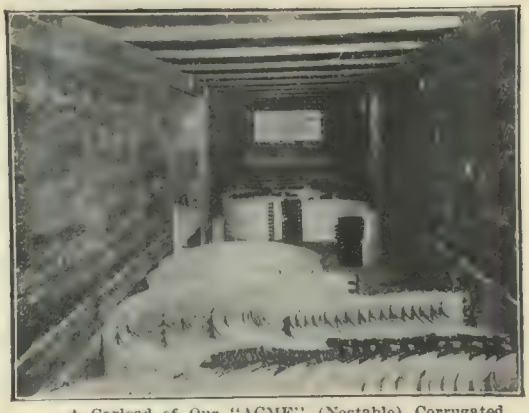
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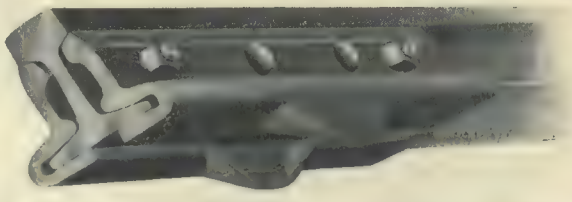
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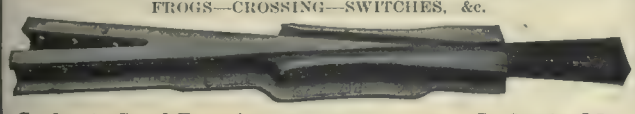
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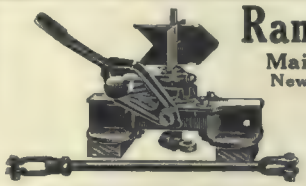


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IMPERIAL WELDING AND CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS

How About Your Road?

¶ Are you going to take advantage of the big saving afforded by doing your bonding, welding of broken metal parts of all kinds, cutting of steel rails, beams, etc., with the Oxy-Acetylene Process?

¶ If so, it will be to your advantage to consider the many distinctive features of IMPERIAL equipment.

¶ IMPERIAL Equipment has established a new high standard of efficiency, because it embodies, to the highest attainable degree, SAFETY, PRACTICABILITY, DURABILITY and PORTABILITY.

¶ The new IMPERIAL mixing principle our regulator that accurately controls delivery of gas, from the lowest to the highest pressures, and the fact that ONE torch covers a GREATER range of work than any other make, are points readily appreciated by practical welders.



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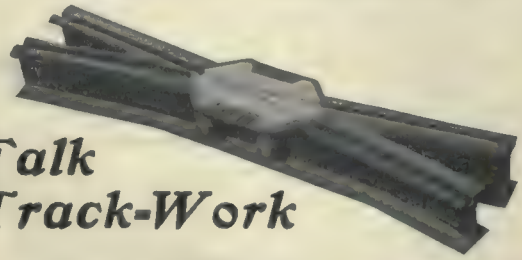


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Manganese Steel and Hard Center Frogs

Switches Mates Crossings

Hundreds of Installations of



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The Cincinnati Frog and Switch Company

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ESTABLISHED 1882

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Single Conductor Outside Type Cable End Bell

You are on the safe side when you specify "Three E" appliances for your Power House and Distributing Lines. Ours are *Quality Products* backed by an *Iron-Clad Guarantee.*

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35,000 Volt Post Insulator with Fittings for Carrying Round Bus.

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ANY MAN who can fire a boiler and obtain as high an efficiency as the Murphy is worth more money to you in some other department.

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The MODERN WAY of handling ASHES is by the PNEUMATIC SYSTEM
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GREEN ENGINEERING CO.
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Circuit Breakers

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For Car Barns and Power Houses

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AMERICAN VULCANIZED FIBRE
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can be adapted to all types and sizes of Power Plants
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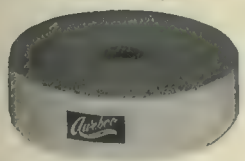
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The ultimate cost of a motor burnout can never be correctly estimated. It frightens passengers and causes delays besides much expense.

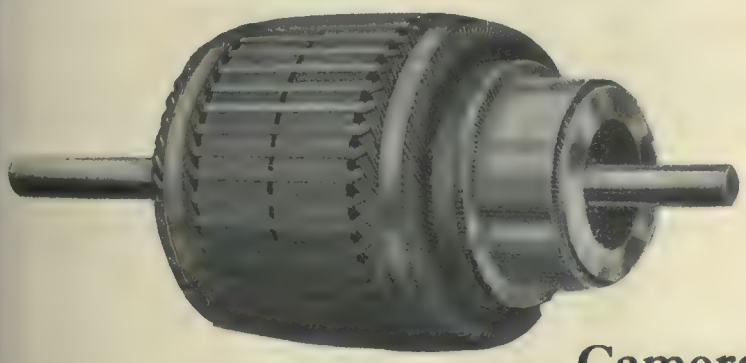
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EMPIRE — Linseed oil treated Cambric, Linen, Silk, Canvas, Duck and Papers. High puncture voltage, long life.

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Always ready for use.
Takes both tickets and cash fares.

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The
International Fare Box

ASSURES

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Accurate Registration.

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This Box Is

Well Built—Fool Proof—Tamper Proof. Working Parts Are of Hardened Steel to Insure Long Service at Minimum Upkeep Expense. Registers nickels, pennies and dimes.

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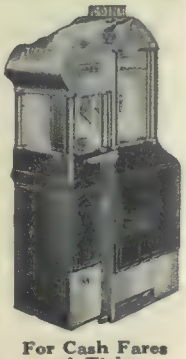
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—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.

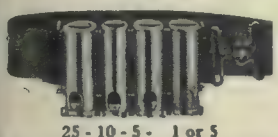
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For Cash Fares

For Cash Fares and Tickets

IN A WORD
THE RAPID READY CHANGE CARRIER



25 - 10 - 5 - 1 or 5

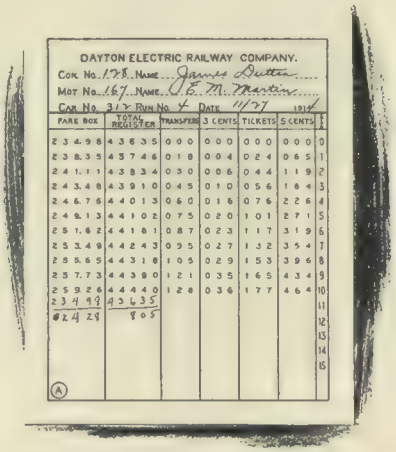
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Railroad and Tram Car Specialties
New inventions developed, perfected and worked for the English market

Messrs. G. D. Peters & Co., Ltd.
Moorgate Works, Moorfields, LONDON, E. C.

The Car Cash Register



DAYTON ELECTRIC RAILWAY COMPANY.
Con. No. 178 Name James Dutton
Mot No. 167 Name J. E. M. Martin
Car No. 317 Run No. 4 Date 11/27 1914

Fare Box	Total Register	Transfers	3 Cents	Tickets	5 Cents	
23498	43635	000	000	000	000	0
23835	43746	018	004	024	065	1
24111	43834	030	006	044	119	2
24348	43910	045	010	056	164	3
24678	44013	060	016	076	226	4
24913	44102	075	020	101	271	5
25162	44181	087	023	117	319	6
25349	44243	095	027	132	354	7
25565	44318	105	029	153	396	8
25773	44390	121	035	165	434	9
25926	44440	128	036	177	464	10
23499	43635					11
$24 29	805					12
						13
						14
						15

Trip record card, ¼ size, produced on

DAYTON Computing Fare-Box Recorder

Hardly a retail store in the land lacks a cash register. The daily income of a trolley car on a busy route would make some of these stores sit up and take notice. Is this income worth protecting?

Write for our trial proposition.

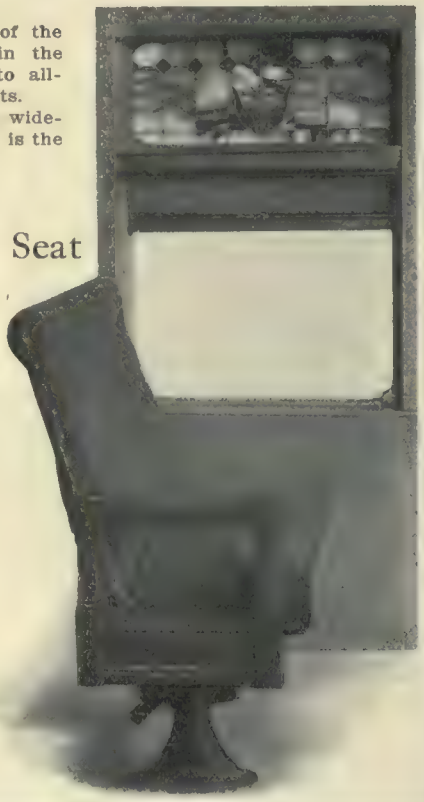
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Dayton, Ohio

981

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Steel Interior Finish

is the product of the largest works in the world devoted to all-steel car products.
One of the most widely used products is the

H & K
Walkover Seat



used by practically every leading railway because it saves in car weight, power and maintenance.
Specify it.

Hale & Kilburn Company
New York
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B-V Visible Punches

As Neat in Appearance as they are Efficient in Service

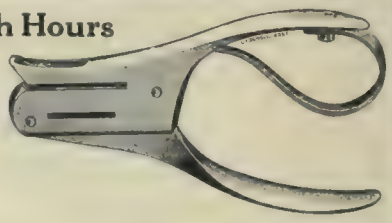


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Factory, Newark, N. J.
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Speed in Rush Hours

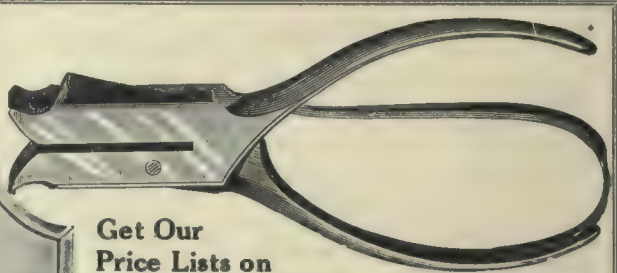
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Conductors handle the crowds quicker when they can pass out transfers fast. A good sharp *punch* is a big help. Buy the punch that stays sharp—the punch with the tool-steel die.

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CAR CURTAINS & FIXTURES FOR ALL PURPOSES
CATALOGUE ON REQUEST

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"UTILITY" Electric Thermometer Control
SAVES 70% In Heating Current

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THE COOPER FORCED VENTILATION HOT AIR HEATER
Patented September 30, 1913. Ask for the full story.
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Eclipse and Acme Fenders Give Immunity from Accident Suits

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is designed for any range of service. Retrieves in less than three inches. Compulsory set; weak spring controlled by thumb nut on face of casing. No tools required for winding or adjusting. Fool proof. Furnished with open or closed rope drum. Use knotted rope or ferrule, as preferred. Less parts than any other retriever on market.

Will send sample for trial.



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RAILWAY SUPPLY CO.
Cleveland, O.

300 Roads use the Drew Safety Mirror



The most common sort of car accident is a step accident. Car starts too soon—passengers still getting on or off—conductor confused—pressed by a dozen demands on his attention.

If the motorman could clearly and easily see whether the steps are clear or not no step accidents could occur. But in order to be able to do that he would need eyes in the back of his head—or else be operating a car equipped with the DREW SAFETY MIRROR. A glance at the illustration shows you how clearly the motorman sees the step without turning his head. A slight expense for Drew Safety Mirrors is saving many roads a big percentage of claims. Write for list and details.

Drew Electric & Manufacturing Co.
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Pneumatic Sanders, Valves, Hoppers of Special Design, Spring Wire Hose, Hose Clamps, and Cotton Hose.
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"Watch Your Step"

If it has
Universal Safety Tread
on it
Proceed in Safety.
If Not
Be Careful

Universal Safety Tread Co., Waltham, Mass.
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Efficiency
Economy
Safety

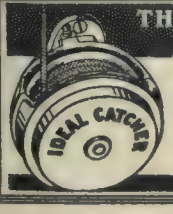


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Soon Pays for Itself
Order One Today
and Convince Yourself
WASSON ENGINEERING & SUPPLY CO.
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KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
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Pole cannot fly up again after Catcher pulls it clear of wires. If rope breaks, conductor can make catcher ready for further service in 5 minutes. Write for full particulars.

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Manufacturer of

Car Gongs of all kinds

Rotary and Single Tap Gongs

The Anderson Automatic Slack Adjuster



Automatically KEEPS The Brakes Adjusted

Promotes Safety—Cuts Down Labor Costs
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"The Easily Installed Adjuster"

This device automatically maintains the proper shoe clearance, keeping the brakes at the highest point of efficiency, preventing the too close adjustment which not only causes undue wear on wheels and shoes but wastes current. Get our new schedule of prices and trial proposition. They will interest you.

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The "Show Me" Spirit Is a Good Sign

The spirit of today is *"show me"* — and the reputable and successful company has to *show 'em.*

We've followed the policy of "showing" the electric railway industry good brake shoe service ever since we started in the business. *Service* is the keynote of our business. The records of roads which use our service brake shoes back up these statements. Get the data.

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For Armature Bearings use Post's "Motor" Metal

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The "Hycap-Exide" Battery

for

STORAGE BATTERY STREET CARS

THE ELECTRIC STORAGE BATTERY CO.
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TULC THE BEARINGS—
It means EFFICIENT LUBRICATION
With LESS LABOR
And NO TROUBLE

Figure out the percentage of oil which runs through without performing its function of lubrication.

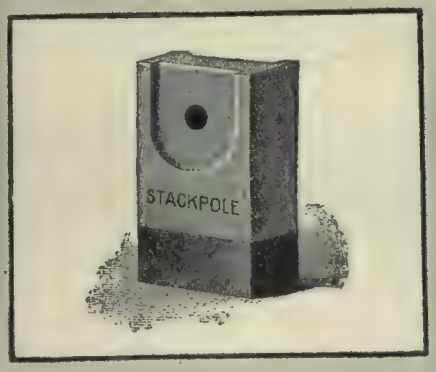
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It feeds to the bearings only when needed—and only in sufficient quantity to thoroughly lubricate.

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Manufacturers of Motor and Generator Brushes



Metallic and Graphite Brushes
Carbon Specialties

St. Marys, Pa.



This is the man who developed the

ACME TRACTION MOTOR BRUSH

It is a distinctly high grade product — uniform — eliminates wear — Longest life and worthy of your choice if you want the best.

Philip Nungesser

Ask us—

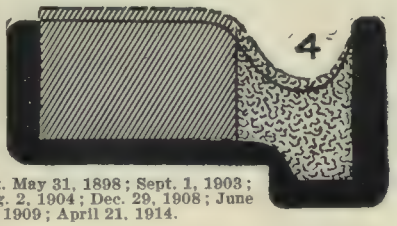
THE NUNGESSER CARBON & BATTERY CO.
Cleveland, Ohio

MEMBER OF SERVICE — THE SOCIETY FOR ELECTRICAL DEVELOPMENT INC NEW YORK — SAFETY — "DO IT ELECTRICALLY"

Wheel Condition No. 4

When the flange only needs correction, this type of

Wheel Truing Brake Shoe



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

will do it—without jacking car up—without removing trucks—without removing car from service.

It's the economical, efficient way.

Wheel Truing Brake Shoe Co.
Detroit **Michigan**

U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago **Atlanta**

RAILWAY SUPPLIES

Selling Agents for Dunham Hopper Door Device—Feasible Drop Brake Staff—Columbia Lock Nut—Kling Bolts—Shop Cleaner—"Texoderm"—U. S. Metal Rail Filing Machine. *Sole Eastern Agents for* St. Louis Surfacer & Paint Co. *General Eastern Agents for* Hutchins Car Roofing Co.—Multiple Unit Puttyless Skylight—Car and Locomotive Jacks—Electric Arc Welders. *Special Agents for* The Tool Steel Gear & Pinion Co. *Special Agents for* C & C Electric & Mfg. Co. *General Agents for* Anglo-American Varnish Co.

g

WHEN you get to comparing costs per car mile for brush service—don't forget to include figures on the Speer Type G Brush.

You can't get bed-rock costs without the Type G. Write for data.

SPEER CARBON CO.

ST. MARYS, PA.

3925

Making "JONES-Built" Means Cars that Endure

For seventy-six years—since the first Jones car was built—this company has been striving to build cars *well*. That is

A Jones Ideal

that is strictly observed today. We can fill rush orders if necessary, and do it on time, too, but *quality construction* goes into every car, from trolley to wheels, just the same. As a result of our adherence to these standards, "Jones-Built" has come to be a certificate of *sturdy* cars — of smooth-running cars — of long-lived cars—of cars with low maintenance records. Write for details of Jones car-building achievements.

J. M. Jones' Sons Company

Builders of Cars for Electric Railways Exclusively

Established 1839 Incorporated 1911

Watervliet, N. Y.

7182

Niles Car & Manufacturing Co.

Niles, Ohio

This steel interurban motor car is 61'8" long, 9'6" wide, is geared for 60 m.p.h., seats 66 persons, has ample space for baggage, and is built for hauling trains, yet it weighs only 43 tons complete on track with quadruple 110 h.p. motors, 750-1500 volt D.C., automatic air brakes with dynamotor, and Baldwin trucks with 36" M. C. B. steel wheels. We now are shipping a duplicate order.



We have worked out construction details in our steel cars from the smallest one-man city car to the largest interurban, which include only standard commercial steel shapes, plates and sheets of the lightest sections consistent with necessary strength. No pressings or forgings from special dies from which repair parts must be obtained are permitted.

THE CINCINNATI CAR COMPANY

WORKS:

WINTON PLACE
CINCINNATI, OHIO

E. G. Long Company

EDWARD H. MAYS, President

Offices, 50 Church Street New York

SPRINGS
CASTINGS
FORGINGS

Peckham Truck Parts

Diamond Truck Parts

Car and Truck Accessories

ELECTRICAL REPRESENTATIVES

Union Spring & Mfg. Co.

Leaf and Coil Springs

MCB Pressed Steel Journal Box Covers

Rollway Bearings

Save

—Lubrication

—Maintenance

—Power



Journal Box Assembled

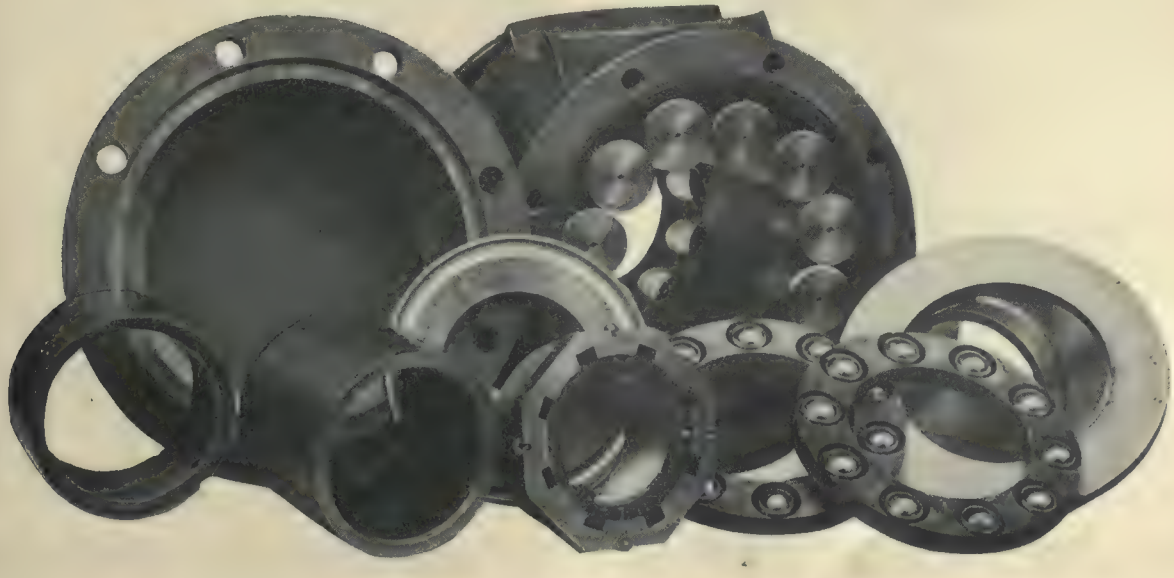
Rollway Bearings save lubrication in two ways: (1) They reduce friction and therefore **require less.** (2) Rollway Bearings are **oil-tight** and **dust-proof.**

Rollway Bearings save maintenance because they have **fixed** adjustment. They are tamperproof, foolproof, and cannot work out of adjustment in service. There is **no play** on end thrust discs. Rollway Bearings can be cared for by the **ordinary** mechanic.

Rollway Bearings save Power. We will gladly furnish records of numerous tests that show exactly how watthour-consumption is reduced with various types of cars and motors, how coasting is increased, how temperature rise of motors is reduced, how general operating efficiency is increased. **Write for this information.**

The Railway Roller Bearing Co.

SYRACUSE, N. Y.





New Fittings for old cars—

—a St. Louis Car Co. Specialty

Remember this: we build—not only every type of car—wooden, semi-steel and all-steel—in accord with the most advanced ideas in modern electric railway car design—but also a complete line of CAR FITTINGS.

And we've been doing this for **years.**

Therefore we are in a position perculiarly **advantageous** to electric railways who are in the market for new fittings adapted to their **old cars.**

If you want fittings designed way back in 1880 we can supply them.

If you want 1915 fittings we have them, too.

We have the patterns, the "jigs," the machinery, the experience, the skill.

You can save time and trouble by coming to us **first.**

ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:
WENDELL & MACDUFFIE CO.
61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

7243



McGuire-Cummings Cars

are Designed and Constructed to Meet Any and All Service Conditions

From the Atlantic to the Pacific Coast and from the Gulf of Mexico to Canada, McGuire-Cummings cars are in service and are establishing excellent performance records.

The mere fact that this company has sold its products in all parts of the United States is not in itself especially remarkable.

But there is a deeper significance to the foregoing statement. In no localities are operating conditions identical. Cars that will successfully meet local conditions on one road may be totally inadequate for operation in another section.

Each railway line has its own peculiar operating conditions. And in each case this company has designed and built cars to successfully meet these local service conditions.

In other words, this company does not build cars merely in accordance with "cut-and-dried" technical details of a set of specifications. Something else enters into the construction of the cars we build. And that something becomes a **vital, tangible** service asset in the **finished product** — a well-built, thoroughly practical car that represents full value for your investment. A car that stands up under **your** peculiar conditions. A car that insures profitable results.

You may find it highly profitable to ascertain just how we can serve you.

McGuire-Cummings Mfg. Company

General Offices—HARRIS TRUST BUILDING, CHICAGO

Builders of City and Interurban Cars and Trucks



SEARCHLIGHT SECTION

FOR SALE

10—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
30—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Trucks.
2—Jackson and Sharp 18′ Bar Bodies.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
10—Wason 10 Bench Open Cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 Bench Open Cars, West. 12A Motors, Brill 21E Trucks.
8—Brill 14 Bench Open Cars, West. 56 Motors, Brill 22-E Trucks.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars complete, 4 G.E. 1000 motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
20—G.E. 80 Railway Motors complete.
12—G.E. 54 Railway Motors complete.
60—G.E. 1000 Railway Motors complete.
60—G.E. 800 Railway Motors complete.
40—West. 12A Railway Motors complete.
32—West. 49 Railway Motors complete.
8—West. 38B Railway Motors complete.
10—West. 112 Railway Motors complete.
4—West. 68-C Railway Motors complete.
4—West. 68 Railway Motors complete.
12—G.E. 73 Railway Motors complete.
24—G.E. 87 Railway Motors complete.
20—G.E. 57 Railway Motors complete.
3—West. 101-B2 Armatures, brand new.
3—West. 93-A2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
22—K6 Controllers.
44—K11 Controllers.
28—K2 Controllers.
62—K10 Controllers.
30—K14 Controllers.
28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheel base.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheel base.
10—Dupont Trucks, 7′ 6″ wheel base.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street, NEW YORK, N. Y.

MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.

2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

An Unusual Bargain

One double truck, single track snow plow, length over all 40 ft., width 8′6″, height 10′9″, truck centers 13′8″. wheel base 4′. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

Price $1,000, F.O.B. Rensselaer, New York.

Albany Southern R. R. Co.

Rensselaer, N. Y.



FOR SALE

ONE 31-Ton Double truck electric 2,000 G. E. motor, series multiple wound, 500 volt D.C., 40″ wheel, complete with Westinghouse air.

HOBOKEN MANUFACTURERS' R. R. CO.
HOBOKEN, NEW JERSEY

FOR SALE

Two Snow Plows: One Sprinkler: Cars, Motors, Rails, Generators. Everything for Track, Rolling Stock, Power Plant bought and sold. Send us your requirements.

Write for our Lists and Catalogs.

Railway & Power Equipment Co.

Charles F. Johnson P. O. Box 155 Ellicott Sq., Buffalo, N. Y.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the

Electric Railway Journal

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M.
Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers all voltages.

Railway Car Equipment

8—**75 H.P. Westinghouse, 112 Railway Motors,** 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—**G.E. 57 Motors,** 50 H.P. Each.
16—**G.E. 67 Motors,** 40 H.P. Each.
20—**G.E. 201 Motors,** 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338-4339 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

CLAIM attorney, desiring change, is open for engagement with electric railway company, where the services of a practical and competent claim adjuster are needed. Have 10 years' active experience in street and interurban railway work, in transportation, construction and claim departments. High class references furnished. Address Box 701, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

EXPERIENCED man open for engagement as general superintendent or master mechanic; many years' experience all branches; A1 references. Box 700, Elec. Ry. Jour.

HIGH grade man desires position as secretary or assistant to busy executive. Fully experienced and thoroughly trained in management of various departments. At present operating official of system of city and interurban lines. Age 35, health good and am willing to go anywhere. Address Box 694, Elec. Ry. Jour.

MASTER mechanic, 14 years' experience with city and interurban railways. Capable of installing and upkeeping all kinds of equipment, solicits correspondence with railway company needing same. Box 699, Elec. Ry. Jour.

POSITION wanted by line foreman, on construction or maintenance. Experienced on heavy catenary and trolley construction. Married, sober and good references. Box 703, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

SECRET service work; several years' experience. Traffic and register inspections, platform service, both street car and interurban. At liberty after March 30th. Best of references from Middle Western properties. Age 27, married. Box 693, Elec. Ry. Jour.

STREET railway superintendent with twenty years' experience desires to make change. Thoroughly acquainted with all branches of the work. Box 702, Elec. Ry. Jour.

SUPERINTENDENT of equipment or master mechanic, open for position; 22 years experience installing, maintaining and rebuilding; up-to-date shop manager. Box 704, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.,	11.60
1-4 page,	20.00	8 in. single col.,	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

WANTED—A position as barn foreman or master mechanic of a road of about 75 cars. Strictly sober; 15 years' experience in remodeling old cars; also equipping new cars. Can give past and present references. Can come at once. Box 682, Elec. Ry. Jour.

WANTED—Position as superintendent of track and way, or roadmaster by a man, age 37 years, with 23 years' practical experience in all branches of street and interurban railway construction and maintenance work. At present employed as roadmaster by large eastern property. Desired change not compulsory. Box 707, Elec. Ry. Jour.

POSITIONS VACANT

SALESMAN wanted, one who sells to wholesale plumber and hardware suppliers, to sell machinery cotton waste. Box 695, Elec. Ry Jour.

MISCELLANEOUS

Rotary Converters Wanted

WANTED—Two 500 K.W. 60 cycle, 6 phase shunt wound Rotary Converters, must be in first-class condition. Give full data regarding length of time run, point of inspection, etc. Box 705, Elec. Ry. Jour.

FOR SALE

Chestnut Poles For Sale

We furnish A, B, C and E grades in any length, 20′ to 75′ and stubbs, chestnut poles and R.R. ties, locust posts and hardwood lumber and timbers. A good stock of poles on hand. Can make prompt shipments. Address Lewis Lumber Co., Relief, N. C.

FOR SALE

500 Volt Meters For Sale

Approximately 75 T. R. W. and Duncan 500 volt, 2-wire meters from 2½ to 150 amperes in first class mechanical and electrical condition. Have been recently tested and calibrated. Selling on account of changing customers to A. C. Address bids to Meter Department, Lehigh Valley Light & Power Co., Allentown, Pa.

25-Tons 6″ HIGH "T" RAILS

POLES AND PILING

NEW CYPRESS. PRICES LOW.

ZELNICKER — WALTER A. ZELNICKER SUPPLY COMPANY — St Louis

New and Relaying Rails,—Equipment—Tanks—Etc.



Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co
New Haven, Conn.

The Classified Advertising in Electric Railway Journal

is read carefully by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand dinky engine at a moderate price, an expert draftsman or superintendent, or the services of a firm of engineers for designing a large modern plant.

The Best Proof

of this is the regularity with which such advertisements are carried—the extent and variety of the JOURNAL'S want ads. Without a constant and appreciable *demand* for such machinery or services, by the JOURNAL readers, the market-place which these advertisements represent could not exist for any length of time.

Electric Railway Journal
239 West 39th St. New York City

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Acetylene Regulators.
Imperial Brass Mfg. Co.

Advertising, Street Car.
Collier, Barron G., Inc

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel and Iron.
American Vanadium Co.

Amusement Devices.
Este Co., The J. D.

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia, M. W. & M. I. Co.

Axles—Car Wheel.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co
Cincinnati Car Co.
Hadfield's, Ltd.
McGuire-Cummings Mfg. Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Motor Truck Co.
Standard Steel Works Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
International Register Co.
Western Electric Co.
Woodman Mfg. & Sup. Co., R.

Bankers and Brokers.
Coal & Iron National Bank.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Nungesser Carb. & Bat'ry Co.
Protective Signal Mfg. Co.
Stackpole Carbon Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Engrg. Co.
Columbia, M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & M. Co.
Post & Co., E. L.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center.
Baldwin Loco. Works.

Bearings, Oilless, Graphite, Bronze & Wooden.
Graphite Lubricating Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.
S K F Ball Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
National Tube Co.
Protective Signal Mfg. Co.
Reiter, G. C.
St. Louis Car Co.
Trolley Supply Co.
Western Electric Co.

Belt Conveyors.
Jeffrey Mfg. Co.

Belting.
Jeffrey Mfg. Co.

Benders, Rail.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Sup. Co., W. A.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Tubes.
National Tube Co.

Bond Testers.
American Steel & Wire Co.

Bonding Tools.
American Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Elec. Ry. Improvement Co.
Electric Service Supplies Co.
Electric Ry. Equipment Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Creaghead Engineering Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Ohio Brass Co.
Lindsley Bros. Co.
Western Electric Co.

Brake Adjusters.
Anderson Brake Adjuster Co.
Sauvage-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Wheel Truing Brake S. Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Jones' Sons Co., J. M.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
U. S. Metal & Mfg. Co.
Westinghouse Trac. B. Co.

Bridges and Buildings.
American Bridge Co.
Brown Hoisting Mach. Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.
Zelnicker Sup. Co., W. A.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Nungesser Carb. & Bat'ry Co.
Speer Carbon Co.
Stackpole Carbon Co.
Western Elec. Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Elec. Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunkers, Coal.
American Bridge Co.
Brown Hoisting Machinery Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Graphite Lubricating Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—see thoses headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Jones' Sons Co., J. M.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
United Electric Car Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition of Copper.
Anderson M. Co., A. & J. M.
Imperial Brass Mfg. Co.

Castings, Gray Iron and Steel.
Amer. Brake Shoe & Fdry. Co.
American Bridge Co.
American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co., The.
Hadfield's, Ltd.
Jeffrey Mfg. Co.
Jones' Son Co., J. M.
Long Co., E. G.
St Louis Car Co.
St. Louis Steel Foundry.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
American Gen'l Eng'g Co.
Hadfield's, Ltd.
Imperial Brass Mfg. Co.
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A certain type of Thibetan punishment consists in tying the criminal to a horse and jogging him over the streets.

Seems like harsh punishment, and you naturally have sympathy for the criminal because he is a human being.

But you have no sympathy for the car motor that is dragged through the streets revolving against brushes that act on the commutator like the cobble stones act on the criminal.

Those who haven't sympathy for a commutator because it has no feeling should show *some* for the humans who pay for the extra commutator wear and repair incident to the use of ill-chosen brushes.

They should have the right Morganite brushes *prescribed* for them—we say *Morganite* advisedly.

To prescribe properly is the service our engineering department offers your road.

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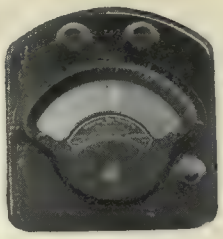
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In Very Small Indicating Instruments for Direct Current

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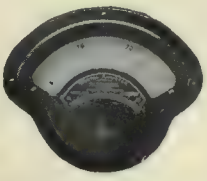


MODEL 280, Single Range Portable Voltmeter
(One-quarter Size.)

PORTABLE

Volt-Meters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters

are supplied in single, double and triple ranges, the Triple Range Volt-Ammeter comprising six instruments in one. This group also includes BATTERY TESTERS.



MODEL 267, Switchboard Ammeter.
(One-quarter Size.)

SWITCHBOARD

Voltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters

This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.

They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate, dead beat and extremely sensitive.

They may be left continuously in circuit at full load and are shielded against external electrical and magnetic influences.

They are substantially constructed and have the longest scale ever provided in instruments of similar size.

The prices are surprisingly low for instruments of such quality.

The several models and ranges offer a selection from over 300 different combinations. They are listed in BULLETIN NO. 8, WHICH WILL BE MAILED UPON REQUEST.

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Won't you try us with your next punch order? Here is our motto:

"Nobody can sell you better punches than we can. Nobody will sell you punches cheaper than we will.

"We guarantee against all defects. We repair our customers' old punches at cost."

We have most business where best known. Our whole business—punches for railways. Try us.

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True to Measurements Impervious to Moisture

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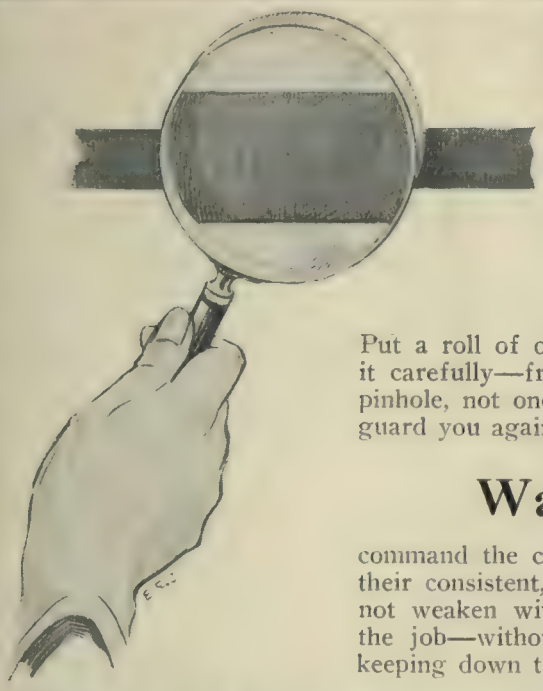
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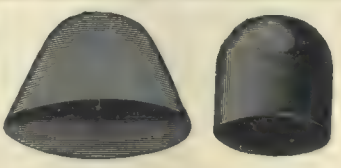


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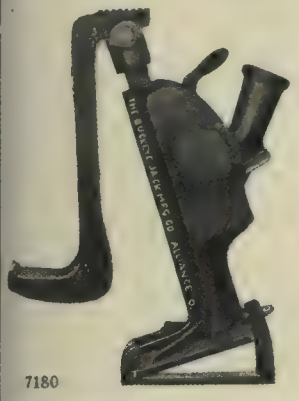
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If proofs before printing are required, changes of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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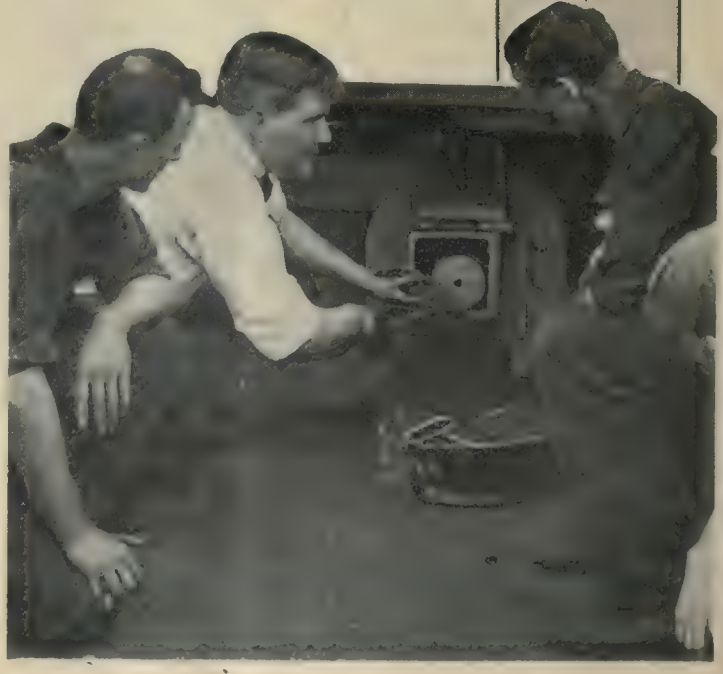
Galena Service is not a case of explaining what to do—

—it's DOING

Galena experts work with and for your men—establish their proper co-operation with efficient methods—and through the medium of Galena Oils produce a saving in your lubricating cost.

A Galena contract makes no restrictions on the quantity of oil to use—quantities may vary but the cost cannot go above the guaranteed maximum.

Why not get ALL the details of the savings we are ready to guarantee under contract?



Galena Signal Oil Co.

Franklin, Pa.

BRILL CENTRIFUGAL SPRINKLING CAR



WHEN the summer schedule is in force and all the available cars are on the lines, each dragging a cloud of dust after it, bringing discomfort where otherwise would be found the most comfortable place on a hot day; then is the time that sprinklers make trolley riding a pleasure and attract many extra riders from sultry streets and suffocating rooms to the breezy cars. But to run sprinklers in between strings of cars without slowing up the running time, is the problem; or rather, it used to be a problem, because in these days there is a power sprinkler that can thoroughly sprinkle a wide street from curb to curb while running at the same speed as passenger cars. The Brill Centrifugal Car is the machine that will do the work and do it efficiently. Ten years of operation on many systems at home and abroad have made sure its entire practicability under all operating conditions. The motor-driven centrifugal pump supplies a uniform pressure at the sprinkling heads, which may be adjusted for any range and amount; gate valves stop the water instantly at crossings without changing the adjustment. There is no possibility of the pump heating up and the whole apparatus has so few wearing parts that maintenance costs are practically nil. Single and double-truck sprinklers with tank capacity of from 2,100 to 4,200 gallons are shown in the Brill Centrifugal Sprinkling Car catalog. Write for a copy.

THE J. G. BRILL COMPANY
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AMERICAN CAR COMPANY
St. Louis, Mo.
G. C. KUHLMAN CAR CO.
Cleveland, Ohio
WASON MANUFACTURING CO.
Springfield, Mass.
COMPAGNIE J. G. BRILL
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G E 247 Ventilated Railway Motor

A Recognized Standard for the Small Wheel Car

The G-E 247 Railway Motor

is designed especially for small wheel cars.

It has positive, uniform ventilation, commutating poles, and every improvement which has developed in producing over 15,000 ventilated railway motors during the past three years.

Four of these motors on small wheel trucks have a service capacity sufficient to replace any four motor city car on your road. The Metropolitan Street Railway of Kansas City has just ordered 200 of these motors with K-35 control and G-E air brakes, for 30-inch wheel cars.

General Electric Company

General Office: Schenectady, N.Y.

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SAMSON SPOT TROLLEY CORD

is smooth and hard, to prevent abrasion. It is thoroughly waterproofed, to preserve it and to prevent swelling in the catchers. Spot Cord saves repair expense; saves time and trouble in daily use.

The Colored Spots are our Trade Mark, used only with this extra quality.

Samson Cordage Works
Boston, Mass.



High Street, Columbus, Ohio

Columbus

Capital of the Buckeye State

THE transportation requirements of this beautiful city are well provided for by the Columbus Railway Power and Light Company.

The enterprising management, always on the look-out for improvement of the service, after a most careful investigation selected Westinghouse No. 306-CV Railway Motors, when it became necessary to replace the motor equipment on some of their cars with more powerful units.

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

East Pittsburgh Pennsylvania

Electric Railway Journal

New York, March 13, 1915

Volume XLV No. 11

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Tapped-field motors give economical operation in both local and express service. The control ties in with the auxiliary circuits and its switches are placed in one box to obtain lowest weight and simplest inspection. Conduit runs have been reduced by eliminating separate conduits for each of the wires in the main circuits.

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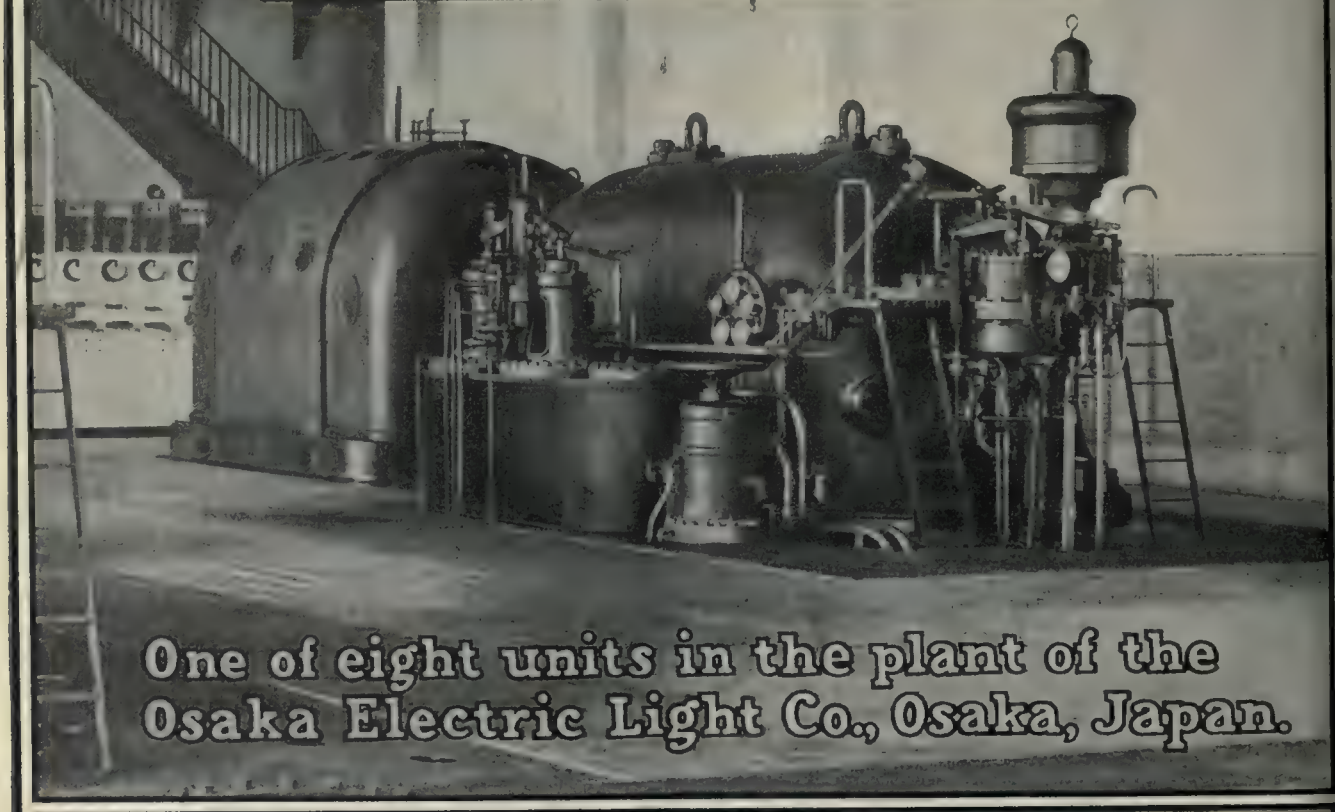
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Circulation of this issue 8000 copies.

Turbines

The most progressive power plants in all parts of the world contain Westinghouse equipment.



One of eight units in the plant of the Osaka Electric Light Co., Osaka, Japan.

The Westinghouse Machine Co.
Prime Movers & Auxiliaries
East Pittsburgh, Pennsylvania.

INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

PUBLISHER'S PAGE

Next Week—

The Maintenance Number

The Electric Railway Journal of March 20 will be the Annual Maintenance Number.

The editors have been preparing the text pages for this issue for some time. The standard for timely helpfulness set in past years will be fully maintained.

The special articles on maintenance matters this year will be particularly valuable.

The advertising section will be worthy of special attention.

Manufacturers in general have been preparing interesting, informative copy that points the way to many important short-cuts and economies.

Many of the advertisers have taken additional space so that they could more fully tell Journal readers the details of the service which is offered.

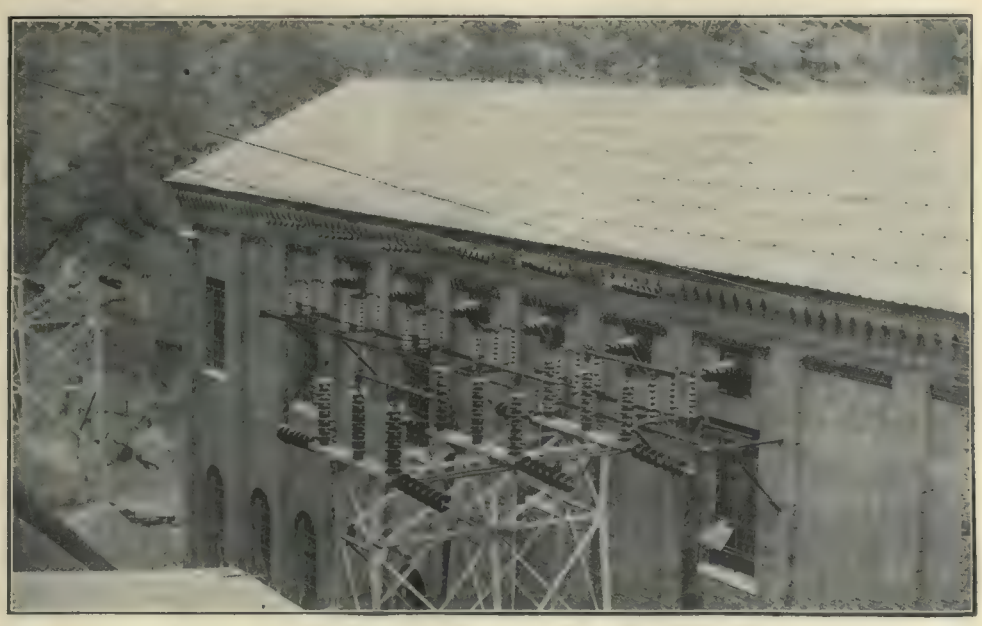
It is well to bear in mind that the advertisers are specialists in their several lines and that rendering real service is one of the fundamentals of their business activities.

Watch for the Maintenance Number.

Read the text pages.

Read the advertising pages.

Make the Most of Them



Stations Using O-B Insulators

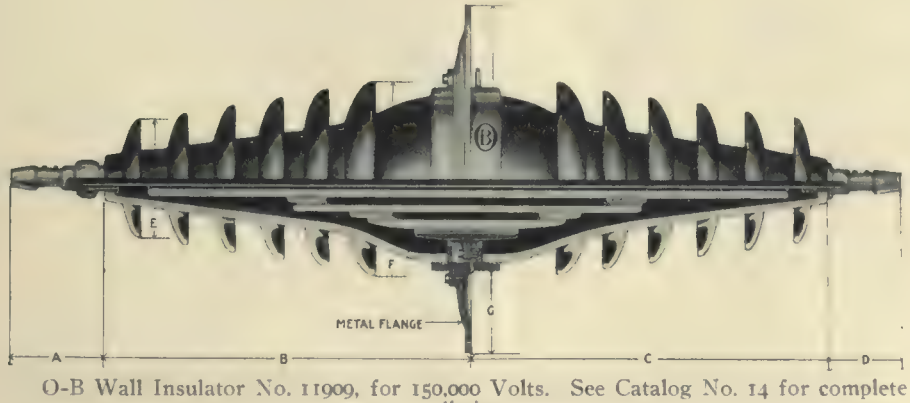
are usually those enjoying reputations for good service. Interruptions due to insulators are rare.

O-B Insulators have a record for continuous service under the most severe conditions because the designs are right and material, manufacture and testing are of the highest order. In other words, they are made after the O-B watchword,

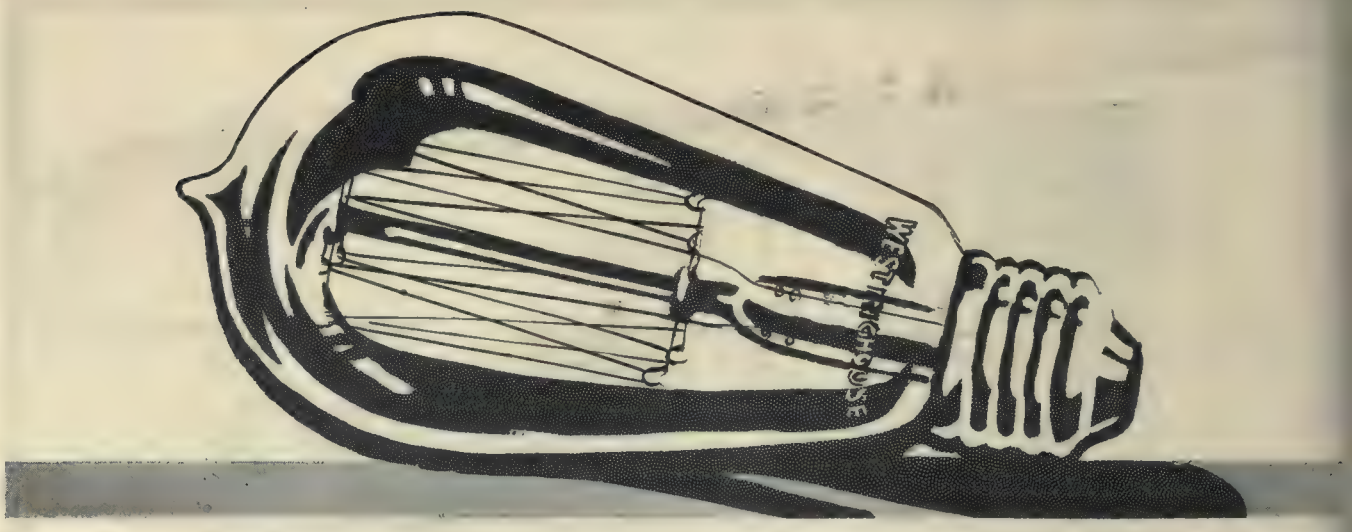
"Quality First"

The Ohio Brass Company

Mansfield, Ohio



O-B Wall Insulator No. 11909, for 150,000 Volts. See Catalog No. 14 for complete listing



As Durable as the Old Style Carbon Lamp

The only logical reason for any continued use of carbon lamps in cars is **durability.**

Westinghouse Mazda Lamps for Railway Service

give this **durability** coupled with Mazda **economy.**

This is an opportunity for your road to effect large economies in energy consumption.

The name "Westinghouse" is your guarantee of satisfactory service.

Westinghouse Lamp Company

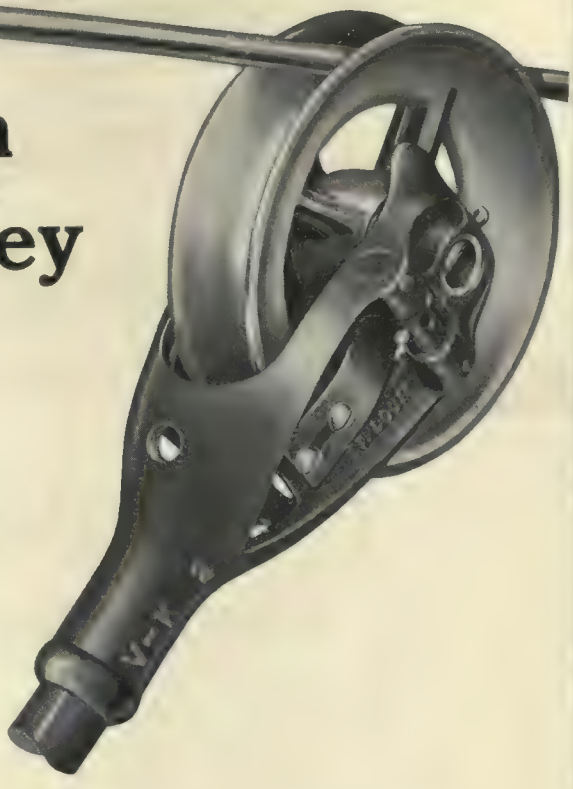
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Syracuse

EXPORT SALES DEPARTMENT—165 Broadway, N. Y.

363

The Name "Westinghouse" is Your Guarantee

Here's the Plain Truth about Trolley Service



IF you measure trolley wheel efficiency by mileage alone, you've chosen a wrong standard of measurement. You should realize that excessive wheel mileage is most often obtained at the expense of overhead construction, and costs more than it is worth.

When you do—you'll appreciate the unusual quality of the service given by the new, perfected

V-K OILLESS TROLLEY WHEEL AND NON-ARCING HARP

This combination is the biggest improvement in Trolley Wheels and Harps ever announced and has proved its superiority by the most complete and exhaustive tests.

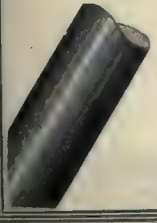
The "V-K" OILLESS TROLLEY WHEEL is made of special alloy, in which toughness supplies durability to the metal instead of hardness. Our special methods of casting and finishing ensure proper balance.

This wheel is self-lubricating—yet has no oil or grease around the bearing to act as insulation—and requires no attention when once installed.

The "V-K" NON-ARCING HARP has a patented and exclusive adjustable gripping device for holding the axle-pin in its socket. This prevents arcing between bearing and axle-pin—interruption of current, and lengthens life of both wheel and harp.

The "V-K" combination of Wheel and Harp will quickly save you their first cost in the greater efficiency and substantial reduction in both operating and maintenance costs they continuously provide.

Send for new illustrated Catalog covering all the "V-K" equipment and the whole More-Jones line of Trolley Wheels and Harps.



MORE-JONES BRASS & METAL CO.
ST. LOUIS, MO.

A PROVEN METHOD OF WEEDING TRACK

The Ultimate of Efficiency

There is no type of weed which Trackoline will not kill, clear to the root, quickly and positively. It has solved the weed problem for hundreds of electric roads in this country during the past three years.

There is no soil, however fertile, that it will not sterilize completely for an entire season. One treatment is all that is required to insure absolutely clean track from the date of application until the following spring.

There is no method of weeding which costs as little per mile per year, as the Trackoline method. The cost of application is less than the cost of a single hand weeding.

Trackoline is unconditionally guaranteed to be harmless to live-stock and non-injurious to ties or rails.

It is unqualifiedly endorsed by those who have used it. After three years' experience, the manager of one of the largest electrified lines in America, writes as follows:

> "Having used a large quantity of Trackoline, I have found that it will do all that is claimed for it, there are no injurious effects on ties or rails. IT IS THE ONLY REAL HERBICIDE I HAVE EVER FOUND."

Full particulars on request

KILLS EVERY WEED TOP ROOT & SEED

TRACKOLINE

COMMERCIAL CHEMICAL COMPANY

1733 Grand Central Terminal

New York City

5

In order to render good service, electric railways must be allowed to earn a fair return on a fair capitalization.

—From Code of Principles Adopted by A. E. R. A.

The returns on an investment can frequently be considerably increased by very slightly increasing the investment.

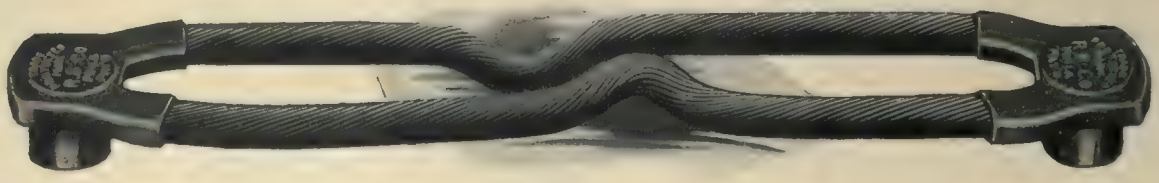
For example, the additional investment required to make an ordinary car into a

Prepayment Car

amounts to approximately 2%. Yet the advantages gained by this slight increment result in increased receipts which frequently return this investment ten times over within every year of the car's life—actually repay the **entire** investment in the car four times during the life of the car.

Progressive roads everywhere have shown that they appreciate the fact that our pioneer work and our continuous study of car engineering represented by the Prepayment patents enable us to render a distinct service—and that the investment required to apply our ideas is insignificant as compared with the returns which such applications insure.

PREPAYMENT CAR SALES COMPANY



Type F C Bond



Type P 4 P Bond

"The Bond with the 'Shot-Over' Sleeve"—Use It

Because its terminals are made of soft, dense copper, forged to shape in dies. They are very soft and ductile and will not crack under compression.

Because the body of the bond is made of pure lake copper, in both cable and flat wire types. This gives you a flexible bond, one that absorbs vibration perfectly and one in which the strands won't break or crack.

Because body is forged and welded to the terminals by a special process; and on every "Protected" Rail Bond, whether compressed terminal type, pin driven type or duplex stud type, this provides a mechanically protecting sleeve—a "shot-over" sleeve—around the strands at their point of emergence from the terminal. It allows the cables or wires to emerge from the terminals in their original form, neither flattened, distorted, reduced in area or burnt.

In every "Protected" Rail Bond, where vibration is most severe—at the junction of terminal and strand, you get new, live, unburnt, mechanically protected copper to absorb it. This is why "Protected" Rail Bonds don't crack at this point.

In considering your Spring bonding, remember that "Protected" Rail Bonds are furnished in compressed terminal type, pin driven type and duplex stud type; remember that every one has the valuable "shot-over" sleeve features; and remember that the proof of their service lies **in the over eight millions that are now in use.**

Wouldn't our broad experience in connection with every class and kind of rail bonding problem be of great value to you right now?

It is yours for the asking, without the slightest obligation on your part.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

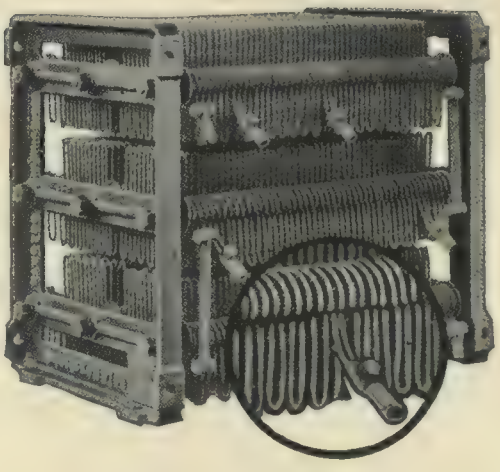
PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

"Starting Resistances for Railway Motors"

If you have been reading the many communications on the above subject in this journal recently you have noticed that they favor the "cut and try" method of adjusting the steps.



E M B

Unbreakable Resistances are particularly adapted to the "cut and try" method

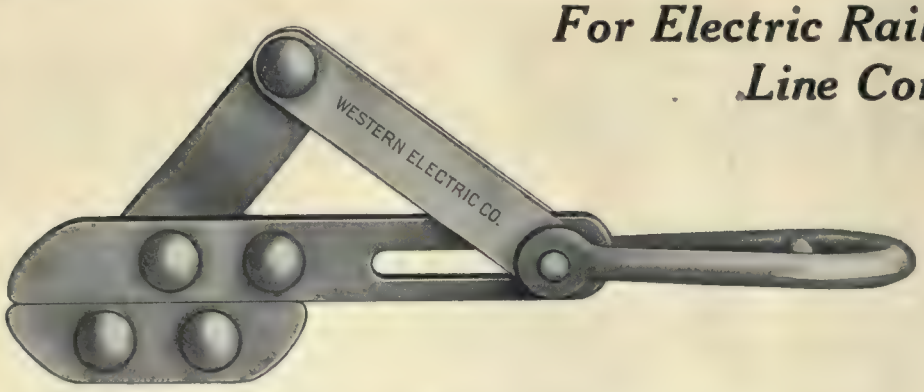
Notice the terminals.
Note that the loops are used for attaching terminals.
The large number of tapping points make terminal shifting from one to another very easy.
In addition to this important feature E. M. B. resistances are rustproof and being **drawn,** instead of **cast,** are practically indestructible.
Write us for data sheet which will enable you to give us just the right material for quoting.

The Ellcon Company

50 Church Street, New York

3126

For Electric Railway Line Construction



The Genuine Western Electric Buffalo Grip

It has our name on it. It locks open while being slipped over the wire then is snapped shut and Holds Against Any Pull.

Furnished also with pulley attached as shown to right or with a lineman's tool.

The jaws hold all sizes of bare or insulated wire up to and including

No. 0000 B & S.

Get Prices from Our Nearest House



The All-Western Electric Tool Equipment gives safety and speed.

"SAVE TIME AND FREIGHT" — DYNAMOS-MOTORS — WESTERN ELECTRIC COMPANY — CABLE-TELEPHONES-SUPPLIES — "TELEPHONE OUR NEAREST HOUSE"

Western Electric Company

Manufacturers of the 8,000,000 "Bell" Telephones

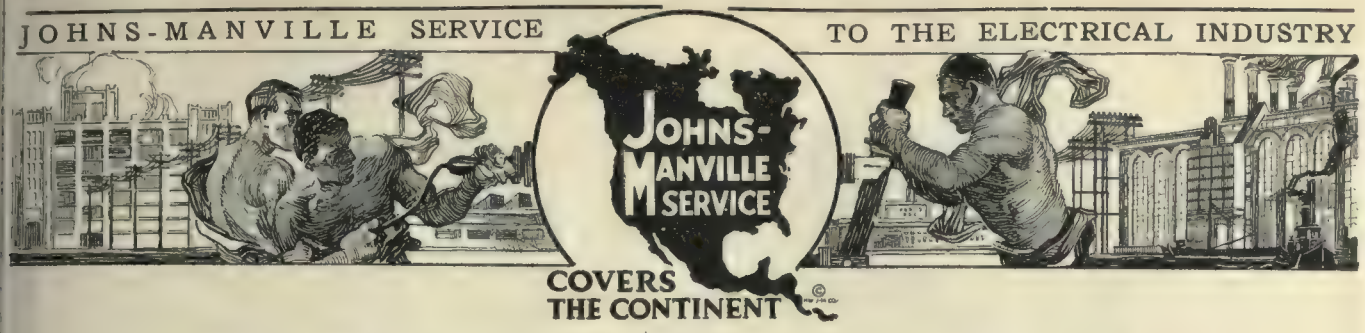
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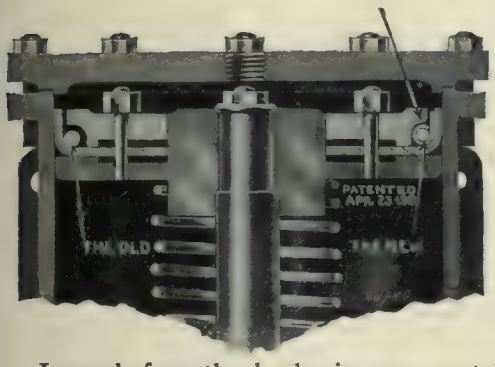
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OMAHA, February 2, 1915.

BROWN & HALL, St. Louis, Mo.
Gentlemen:

I feel that some explanation is due regarding this photograph.

You will note that this picture shows the Golden Glow headlight and also the ordinary dash type incandescent headlight below. You will recall that we formerly used arc headlights in the outlying districts and the incandescent light when in town.

We replaced the arc light with the Golden Glow and use it exclusively on these cars, the semaphore lens lamp not being used at any time.

The latter was set in the dash and as we have not needed them elsewhere and the cars have not been overhauled, the lower light has been left in the car dash up to this time.

Yours very truly,
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Purchasing Agent.

Golden Glow Headlights Are Winning in Every Test

Because

They Give More Light than an arc or any other incandescent headlight. This is easily proven. You can actually see further down the track, pick out switch points, distinguish passengers in easy stopping distance.

They Provide a Different Quality of Light —a soft golden beam which will not dazzle or blind those approaching. It will penetrate fog and rain far better than a white light. On city streets where lights are numerous the beams from the "Golden Glow" blend with the general illumination. In dark sections "Golden Glow" gives a result which cannot be secured with any other headlight.

They Decrease Expense of front-end illumination. The average arc light costs $75 to $80 per year for current and maintenance. It consumes from 2½ to 5 amperes, 1.4 to 3 K.W., a very considerable amount. "Golden Glow" uses between 23 and 150 watts, depending upon the type and service. There is no maintenance to the "Golden Glow" mirrored glass reflector, nothing to wear out, and replacements are limited to the renewal of incandescent bulbs.

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Scores of operating officials all over the country have accepted our offer to make an actual service demonstration of "Golden Glow" headlights. We leave the lamps on the car for a month or two, subject to their most severe conditions.

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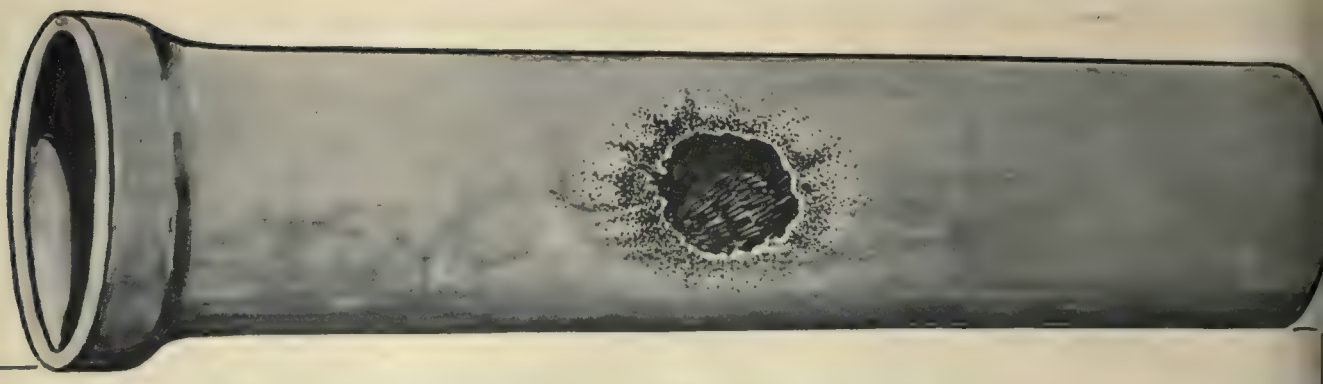
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100% Splice Bars Tie Plates



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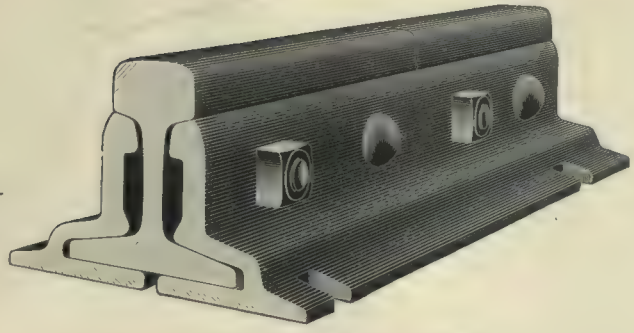
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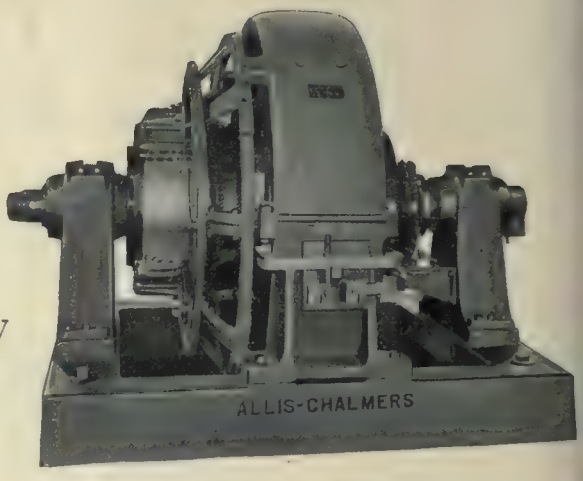
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My nerves are pure copper; my muscles hard iron. The slightest contact with my sensitive nervous system (altho afar off) arouses me to instant action.

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NACHOD SPELLS SAFETY

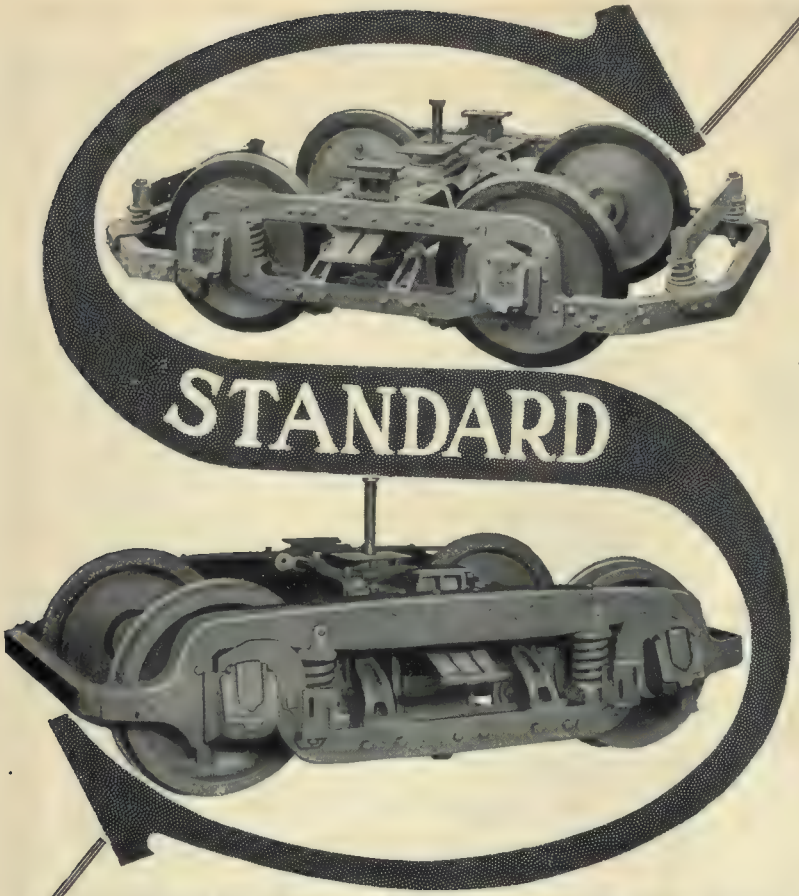
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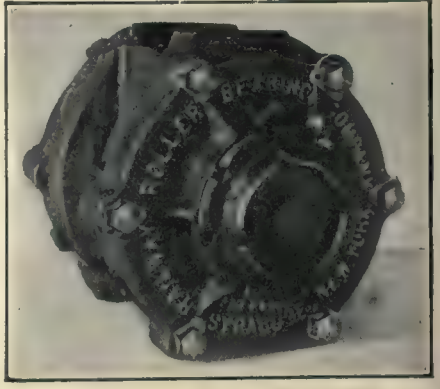


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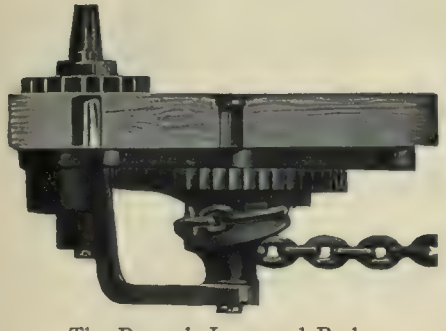


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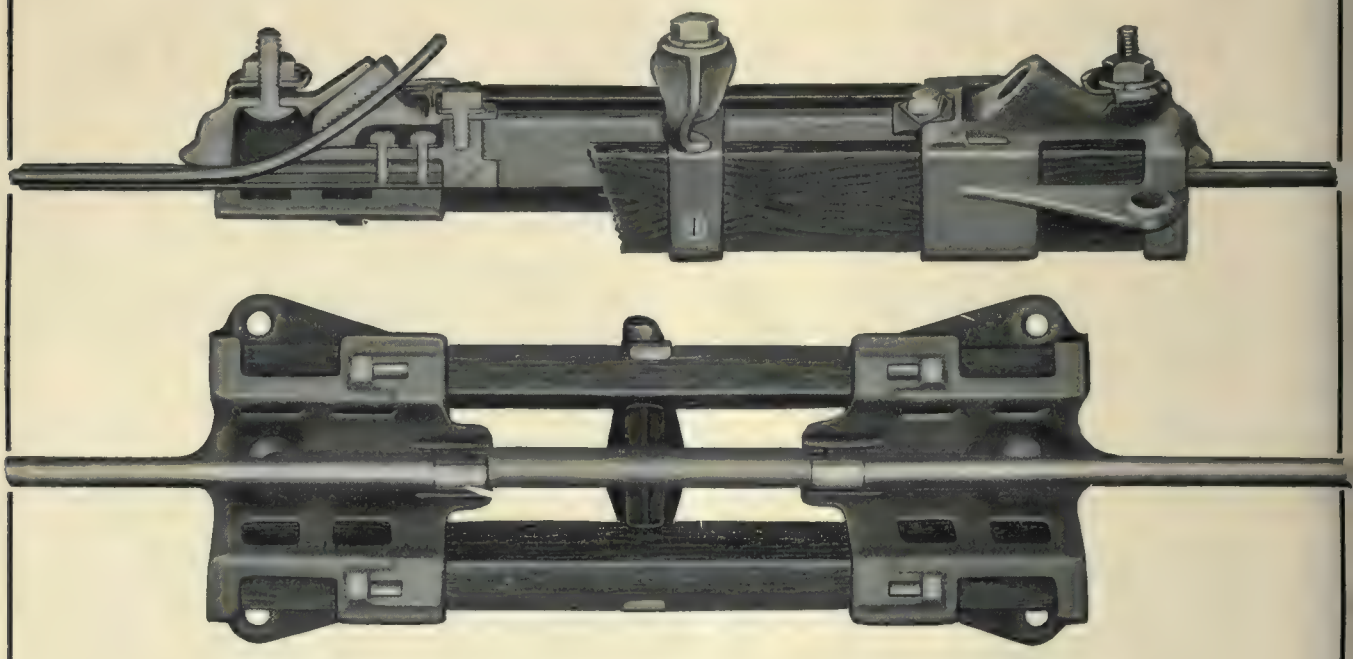
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Two years ago the Form L 4 section insulator was designed by G-E engineers and was the first of its kind in the field. It is designed to meet all requirements of a first-class device for sectionalizing a trolley line and the large number now in use all over the country demonstrates the serviceability of the device. The Form L 4 insulator has a greater tensile strength than 4/0 copper trolley wire and hence is very durable and efficient. Wooden parts are oil treated and metal parts sherardized by the G-E electric oven method.

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5309

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY, MARCH 13, 1915 No. 11

NEW YORK ALIEN LAW AMENDMENT

The amended Spring bill that has just passed the New York State Senate points the way to an apparently workable settlement of the alien labor question in connection with subway construction in New York. The bill provides that preference shall be given to citizens over aliens in work on public contracts but that aliens may be employed where citizens are not available. The term "not available" would supposedly give contractors the proper freedom of action and make it possible for them to select their laborers on the basis of physical fitness and willingness to work for the wages paid to aliens. The bill does not admit the illegality of the exclusion of aliens, but in a hedging fashion it is a confession of the inexpediency and unfairness of so doing. As long as aliens are admitted to this country, they should not be deprived of equal opportunities of livelihood by exclusion from labor on public works or similar provisions. If they are to be seriously hampered in their labor, it would be better to attack the matter at the source and prohibit the immigration. As long as this is allowed, comity between state and national governments demands fair treatment of them in this country.

LEGISLATIVE REPORT ON REGULATION

The most striking feature of the report of the legislative committee on the investigation of the Public Service Commission of the First District, New York, is that it was not unanimous. While the members of one political party, constituting the majority of the committee, condemn the commissioners, a minority, including all the members of the other political party, defends them. Even the majority is not entirely unanimous in its conclusions on its own findings. There was an excellent opportunity here for a careful and unbiased examination of the efficacy of commission regulation. At the time it was begun the New York system constituted a radical departure from those followed by other states, and the extent of the interests involved made the experiment which was initiated by Governor Hughes in 1907 of great importance to the country. The chief question on trial was whether, under our political system, it was possible to keep the commission free of politics, a condition which many doubted. The report of the legislative committee, dividing as it does on party lines, will emphasize this doubt so long as the law governing the appointment of the commissioners and their removal from office as it exists at present remains on the statute books. This conclusion will remain irrespective of the qualifications of the present commissioners in New York for their office. We believe in the regulation of public utilities by commissions but insist that the office should be surrounded by as many safeguards to secure independence of judgment and action by the commissioners as in the case of justices of the Supreme Court. In no other way can good men be obtained or retained.

CUTTING DOWN ASSOCIATION DUES

It is not often that an association makes a reduction in dues as the American Electric Railway Manufacturers' association has just done. This reduction, while temporary, is an indication of a desire on the part of the management to share with the members the saving which is to be effected by omitting special exhibits at San Francisco. The amount of money saved to each member is not great, but the impression created by the reduction cannot but be favorable. While the great industrial show which has come to be such an important feature of the annual conventions is the most conspicuous of the association's activities it is, after all, only a part of the machinery for fostering good relations between the operating and manufacturing divisions of the electric railway industry. Those who are in touch with the permanent headquarters know that it is a center of unceasing diligence. There is, therefore, a necessity for a reasonable income aside from that connected with the exhibits. The omission of the convention exhibits will be a relief to those who would otherwise have been responsible for its management. As a former association president said recently in the writer's hearing, few of the attendants at a convention realize the weight of the burden of responsibility, for the safety of the members and guests and the smooth working of the exhibit and entertainment plans, which rests upon the few who bear it. Any slight faults of the superstructure are so much more conspicuous than the virtues of the foundation that they are apt to cause more comment. A little relief this year will produce results in renewed effort on behalf of the 1916 meeting.

REGULATION FROM A NEW QUARTER

While the investigation of the New York Public Service Commission has been going on Dr. S. S. Goldwater, Health Commissioner of New York, has hit upon a plan which he thinks has solved the problem of public service regulation. His method is simple. It consists simply in invoking the police power which under the law is granted to the health commissioner to make the railways do what he thinks proper. An obvious merit of this plan is that it obviates extended hearings with counsel on both sides, any division of opinion among several commissioners and any necessity

of a staff of legal, engineering or transportation experts to advise the commission. Under this new system of regulation, if the health commissioner thinks that the railway cars should not carry more than one-and-a-half times their seating capacity, the conductors of the cars must close their gates when that number is on the car, and those who cannot get on the cars must walk home. Another advantage of Dr. Goldwater's plan, besides its simplicity, is its comprehensiveness. Its application is by no means confined to the surface railways. If the water supply of the city becomes insufficient, it is dangerous to health, and the health commissioner may order more aqueducts. Theaters inadequately supplied with exits must be closed until the condition is remedied. Building laws must be modified according to the ideas of the health commissioner, and parks must be opened in different parts of the city because they are necessary as breathing spaces to the public. Still another advantage of Dr. Goldwater's plan is that it reduces all of the city offices and commissions to one, with the possible exception of the police department, which we assume will be retained in order to carry out the orders of the health department. We commend the idea to the consideration of students of municipal problems.

THE "JITNEY" SITUATION

The "jitney" has now reached Portland, Me., having completed the journey from California to Maine in less than four months, because it was only last November that its advent in Los Angeles began to attract attention in other cities. Some railway men profess to see the wane of the movement and base this idea upon the adverse legislation which has been passed in different cities. Others do not yet see any material reduction in the "jitney" movement. They base this belief on the large number of second-hand automobiles in the country and the desire of their owners to get the most out of them before they are thrown on the scrap heap, the favor of the public at large for novelties, and the influence which the automobile manufacturers will presumably be willing to exert to stimulate the demand for both old and new automobiles. This influence is apt to be powerful, especially when exerted through local dealers, agents and branch managers, all of whom are large advertisers for their local business in the daily papers.

Those who do not see an early end to the "jitney" movement say that it may not be difficult to prove that the "jitney" is a losing proposition; that an attempt to substitute "jitneys" for electric cars on streets in any large numbers would produce the worst kind of congestion, and that to meet "jitney" competition the electric roads would have to reduce their service to the suburbs and perhaps increase their long-haul fares. But these points, they believe, would not greatly influence the owner of an old car that has practically no value except in "jitney" service, nor would it deter a great many people from patronizing a "jitney" instead of a street car if it carried them to the place to which they wished to go.

How, then, can the situation be combatted by all those who realize the conditions under which the electric railways are carrying people long distances for a 5-cent fare?

One thing which can be done, and must be done, is to correct misstatements as to the cost of "jitney" operation when they appear in the local papers. Articles of this kind will not be uncommon during the next few months. The "jitney" bus is a novelty and, as such, appeals to the editor of the average local daily paper. The arrival of the first "jitney" in a town makes a good "news" item, and the arrival of a second or third will make another. It is to be expected, also, that stock companies will be organized to operate buses of this kind by promoters who see through them an easy plan to draw money from confiding stockholders in small amounts by alluring statements. Railway men who see figures of this kind in print and know the facts should not hesitate to set the public right as to the profits which can be made in this kind of transportation. They should also point out the most conspicuous objections of the unrestricted "jitney" for general transportation, such as the lack of regulation over their routes and schedules, the dangers to women from riding in closed cars, the unsanitary features of the cars as compared with electric cars which are cleaned regularly, perils to pedestrians, etc. We believe that the "jitney" will not be a permanent competitor of the electric car, even for short distance business, but we also believe that its disappearance can be hastened by active local attack upon its weak features by the electric railway companies.

IMPROVEMENT OF CONVENTION PROGRAMS

We know of hardly any place where careful, conscientious planning will return a larger amount of money for work expended than in the drafting of a convention program. If we assume that the average expenses per delegate attending a convention lasting a day is from $10 to $20 and the value of his time the same amount, we get from $20 to $40 as the amount which each delegate or his company will spend for his attendance. With 100 delegates at a convention we have from $2,000 to $4,000 as the expense of a convention with that number of attendants and lasting for but one day. Expressing this in the electric railway man's fiscal unit, it is from 80,000 to 160,000 nickel fares. This is a considerable amount of money, and every effort should be made to see that the association as well as the delegates get full return for its expenditure. Assuming that the sessions cover six hours, the cost of this time is of the order of $10 per minute. Now, a considerable part of the value of a convention to those in attendance is represented by the papers and discussions presented; that is, by the technical proceedings. There are other advantages, such as meeting representatives of other companies and exchanging experiences with them in private conversation, but, after all, the official program is the pièce de résistance of the meeting, as well as the means of gathering the largest attendance and of eliciting the best exchanges of experience. For this reason the com-

mittee on subjects is one of the most important which any association can appoint.

In this connection the Southwestern Electrical & Gas Association has established an interesting plan to secure a program of this kind. The secretary, in laying his plans for the annual convention some two months off, has called the attention of the members to the fact that it would be a waste of time "to give up the various sessions to matters full information as to which may be obtained at any time from the secretary or from the technical papers or from text books." In consequence, the members are urged to send in suggestions as to topics of a practical but unfamiliar nature so that the papers and discussions may give information not available elsewhere and where the experience of the members will be most valuable to each other. The plan is a good one in principle and should also be so in practice, as, indeed, it has proved in previous sessions of the Southwestern Association. Progress is being made so rapidly in the electrical field that there should be no dearth of good subjects, and we have no doubt that the Southwestern Association can find this year a sufficient number of them to make a live program for its 1915 meeting.

Why would it not be a good idea for a sectional association in search of a good topic to select one which has been considered at one of the other sectional sessions? The subject could be introduced by the presentation of a summary of the paper as read at the other convention and an abstract of the conclusions reached there. The ELECTRIC RAILWAY JOURNAL believes in the value of sectional associations and has always made a feature of the publication of their proceedings, so that this information is easily available. Starting at this point, those in attendance could give their views without retracing any ground already covered, and in this way a consensus of opinion from all parts of the country would be obtained on different subjects which would be of the greatest value to the industry.

ENERGY REGENERATION IN HEAVY TRACTION

In the steam railway electrifications on lines having grades the possibility of energy regeneration has had a potent influence in the selection of system. Not that the actual saving in energy was necessarily a prime consideration, but the accompanying braking effect, with reduction in brakeshoe wear, has been considered a feature to be secured if possible. Assuming that total resistance would be about the same for a train ascending a grade and descending it while regenerating, it should regenerate all of the power due to the grade in excess of 1 per cent. It should, of course, be capable of holding back when going down any grade that it can climb. Actual data of regeneration on a section of the Italian State Railways were given in an article by G. Pontecorvo which appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL. These showed a regeneration of 50 per cent on a grade of 3 per cent to 3½ per cent and a reduction of two-thirds in brakeshoe wear. There is no doubt, therefore, that practice bears out theory in this case.

One complication of the regenerative systems has been the necessity for taking up surplus power supplied by a train descending a grade when there was not a demand for it from other parts of the line. This has to be provided by rheostats in the power house, as described in the article referred to above, as it would scarcely be practicable to take it up by train brake application.

The three-phase system, which has had some vogue abroad, has made its claim to favor on the basis of its natural or inherent regenerating ability. When one thinks of regeneration this system instinctively comes to mind. But the thinking usually stops there because the imagination immediately conjures up a picture of networks of overhead, entangled wires, at the entrance to some familiar freight yard, for example. As a consequence, we have in this country but one lonely three-phase electrification in full commercial operation to-day, and this is so far away that very little is heard of it. In this Great Northern Cascade tunnel plant, braking qualities were considered of prime importance, but energy saving was not, as the water-power could be used for nothing but the railway and hence had little value after having served its purpose.

The next step in regeneration progress is the single-phase-three-phase electrification now rapidly approaching completion on the Norfolk & Western in West Virginia. In this three-phase power is produced in the locomotive from single-phase in the heretofore little-used phase converter. In this case, also, economical braking was considered more important than energy saving. Unofficial reports from that region indicate that the converters are doing their work in first-class fashion.

In the meantime the regenerative principle is being applied in the designs for the great Chicago, Milwaukee & St. Paul electrification, and details of the regenerative equipment are awaited with great interest. To date the d.c. series motor has not been considered a satisfactory generator although it has been so used with the magnetic brake to a limited extent. The St. Paul plan, whatever it is, will constitute the third important step in the series. To offset the additional complication of equipment, the d.c. regenerative scheme will have an advantage over the a.c. in that the motors become self-exciting generators and do not therefore depend upon the power house for excitation. A three-phase locomotive would, of course, "run away" if it were not held by the brakes if for any reason power went off the line.

These examples show conclusively that for heavy trains on steep grades regeneration is practicable. That to date it should have been used primarily for the sake of a by-product is interesting. On general principles of energy conservation it is gratifying to realize that we shall shortly have in operation three heavy electrifications, all employing different types of equipment and all regenerating energy on down grades. Some valuable data should soon be available for comparison from the regeneration standpoint.

The New York Municipal Car—Motors, Control, Conduit and Collectors

Tapped-Field Motors Give Economical Operation in Both Local and Express Service—The Control Ties in with the Auxiliary Circuits and Its Switches Are Placed in One Box to Obtain Lowest Weight and Simplest Inspection—Conduit Runs Have Been Reduced by Eliminating Separate Conduits for Each of the Wires in the Main Circuits

The motors, the control and the accessories of both on the New York Municipal car embody the same principle of progress that characterizes the features of design and equipment which have been previously described in these columns.* As the following paragraphs will show, the New York Municipal Railway Corporation has not only taken advantage of the latest advances in the art but it has also set up new standards and devised new practices which will accrue to the benefit of other electric railway operators.

Character of Forthcoming Service

To appreciate the reason for electing to use the tap-field motor in the forthcoming service it is well to point out that three distinct services—local, express and a combination or these two—are contemplated. For purely local runs the schedule speed will be 15 m.p.h. with an average station stop of 20 seconds, and for purely express service the speed will be 25 m.p.h. with an average stop of 30 seconds.

On a typical local run like that of Fifty-ninth Street, New York, to Coney Island, by way of the Manhattan Bridge and Brighton Beach line, the shortest distance between stations will be 1100 ft., the longest 6220 ft., exclusive of the Manhattan Bridge, and the average 2430 ft. The length of this run will be 68,090 ft. plus the 10,560 ft. of the Manhattan Bridge.

On a typical express run like that from Forty-eighth Street, New York, to Sheepshead Bay, the shortest distance between stations will be 3930 ft., the longest, 9870 ft. and the average 7230 ft. The length of this run will be 43,380 ft.

On a typical combined express and local run like that from Forty-eighth Street, New York, to Coney Island via a 7000-ft. tunnel and the Brighton Beach line the shortest distance between stations will be 1263 ft., the longest, 9870 ft. and the average 4573 ft. The length of the run will be 82,327 ft. In general the local runs will be longer but the express runs shorter than on the present rapid transit lines of New York.

It was obvious that the tap-field motor was ideal for running conditions of the character described, inasmuch as such a motor could be run on full field in local service and on tapped field in express service. Self-ventilation was also desirable for the motor because the limiting weight per driving axle made it essential to combine greatest output with least weight. Besides this, the motor equipments will be kept in almost continuous service, as some of them will have only three minutes lay-over at terminals during continuous working periods of eighteen hours. Local trains will consist of two to five cars each and express trains of two to eight cars each.

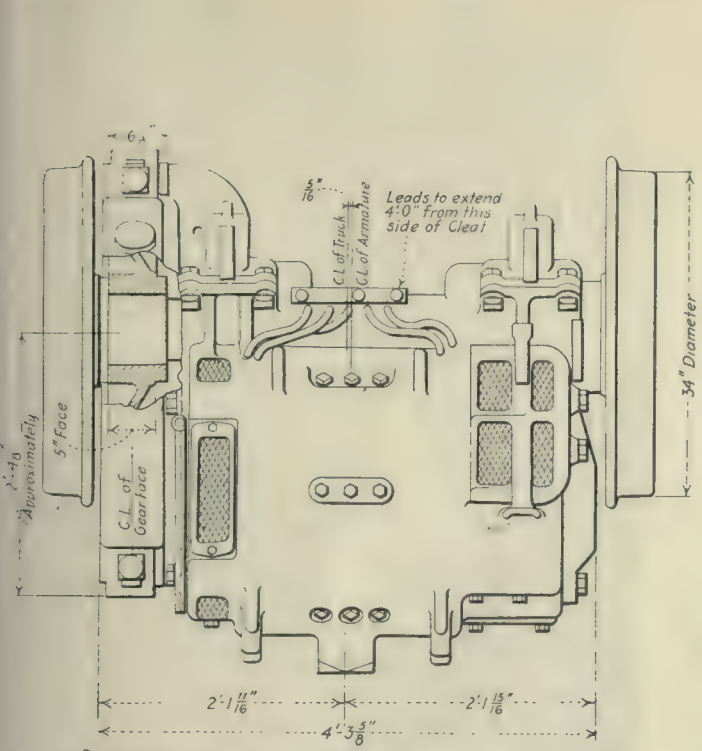


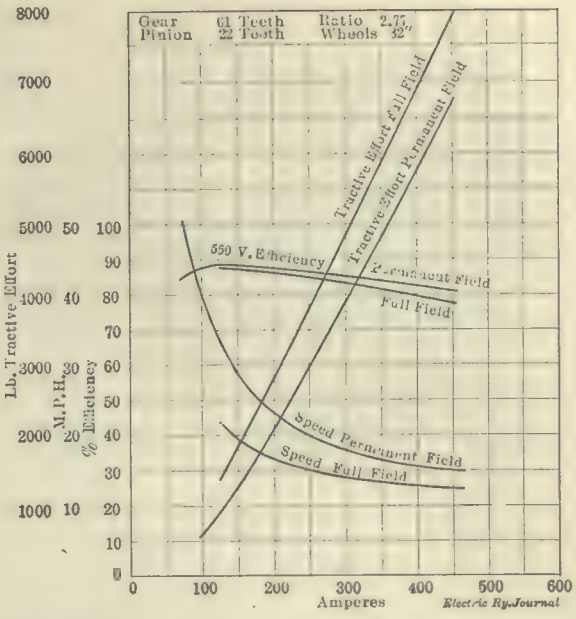
NEW YORK MUNICIPAL CAR—THE FIRST EIGHT-CAR TRAIN READY FOR A TRIAL RUN ON THE NEW SEA BEACH LINE

The Motor

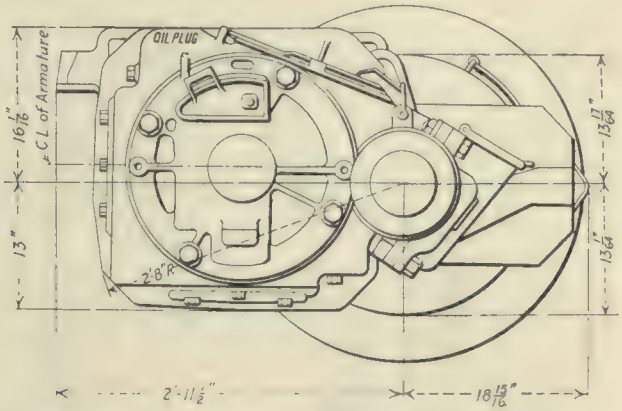
The motor selected for the first 100 cars (two per car) is the GE-248-A commutating pole type with fan assembled on the pinion end of the armature head. The frames are also constructed with openings in the covers. The motor weight, including the gear, pinion and gear case, is 5975 lb. The motor, under the A. I. E. E. standards, has an hourly rating of 160 hp at 600 volts.

*See New York Municipal Car articles on "Design," "Body" and "Trucks, Brake Rigging and Draft Gear," June 6, June 13 and Dec. 26, 1914, respectively.





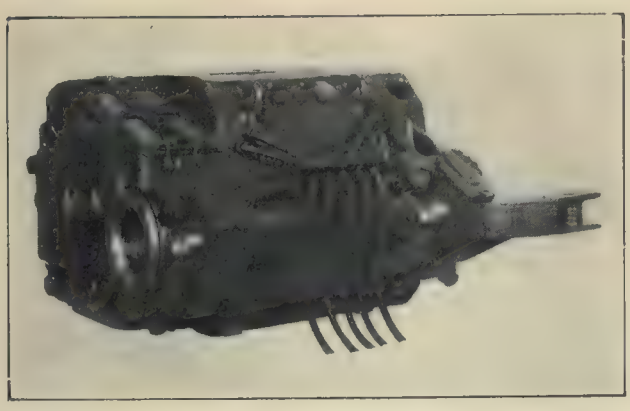
NEW YORK MUNICIPAL CAR—CHARACTERISTIC CURVES OF 160-HP TAP-FIELD MOTOR



NEW YORK MUNICIPAL CAR—OUTLINE DRAWINGS OF 160-HP MOTOR, USED TWO PER CAR, SHOWING ALSO ARRANGEMENTS FOR VENTILATION, OUTSIDE OIL GAGE WELLS AND ARRANGEMENT OF LEADS



NEW YORK MUNICIPAL CAR—COMBINED SIDE AND END VIEW OF COMPLETELY EQUIPPED CAR



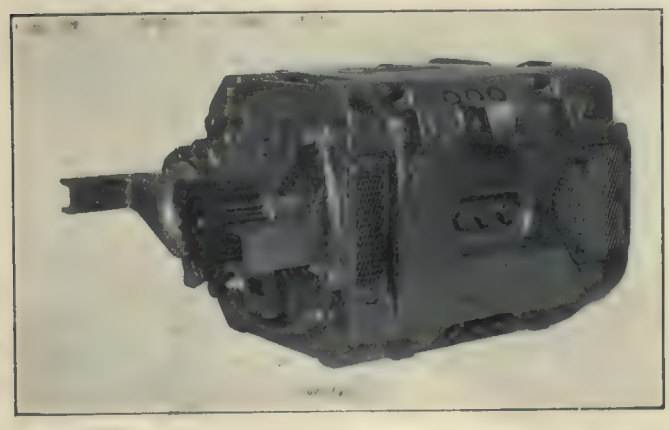
NEW YORK MUNICIPAL CAR—AXLE SIDE, COMMUTATOR END OF MOTOR

This motor must operate over a voltage range of 450 to 750 volts, and its continuous ratings up to 600 volts are as follows: 140 amp at 300 volts, 147 amp at 400 volts, 154 amp at 500 volts and 157 amp at 600 volts, with a temperature rise in the windings not exceeding 75 deg. Cent. when all the covers are off. The general characteristics are shown in the curves on page 497. The ability of two of these motors to propel at an average of 550 volts a car weighing 113,000 lb. fully-loaded (200 passengers at 140 lb. each) is based on an assumed adhesion of 27.5 per cent between the driving wheels and rails, a curve resistance of 0.8 lb. per ton per degree of curvature and the following train resistance values:

M.P.H.	Pounds Per Ton	M.P.H.	Pounds Per Ton
8	7.26	30	11.86
10	7.45	32	12.21
12	7.81	34	12.76
14	8.14	36	13.20
16	8.47	38	13.75
18	8.91	40	14.19
20	9.35	42	14.74
22	9.79	44	15.29
24	10.23	46	15.95
26	10.72	48	16.50
28	11.22	50	17.05

The train resistance values were derived from tests made on near-by rapid transit lines.

The motor frame is of the box type, of cast steel fitted with a removable wearing plate of hardened steel on the motor suspension lug, and with cast bales for handling the completely assembled motor. A feature in the construction of the field coils is that their final coating of insulating compound has the unusually high melting point of 135 deg. Cent. Other features are that metal shields are fastened on the inner perimeter of the coils to prevent chafing on the pole pieces and that all the field coils are held in place against flat steel springs to prevent their movement in service.



NEW YORK MUNICIPAL CAR—SUSPENSION SIDE, PINION END OF MOTOR

The brush-holders, which are designed to permit 1-in. safe radial wear of the commutator, have shunts so constructed that they will not have any wearing action against the brush-holder casting. The brushes are placed in staggered relation, and their tension is adjustable between 3 lb. and 10 lb. The mica insulation between the commutator bars is cut 3/64 in. and extends ⅛ in. back of the commutator neck.

Lubrication has received special attention in the design of this motor. The bearing housings are supplied with separate oil gage wells and waste chambers. By removing the wooden plug of the external well and inserting a gaging ruler, the shopman can determine the quantity of oil in the gage well and if necessary can replenish the oil supply without exposing the lubricating packing to dust or needless handling. Oil deflectors are provided on the armature shaft to prevent the oil from working into the motor windings, onto the commutator or onto the brush-holders. The housings also contain grooves for conducting overflow oil to an auxiliary chamber on the outside of the motor. Wool waste is used in both the armature and axle bearings.

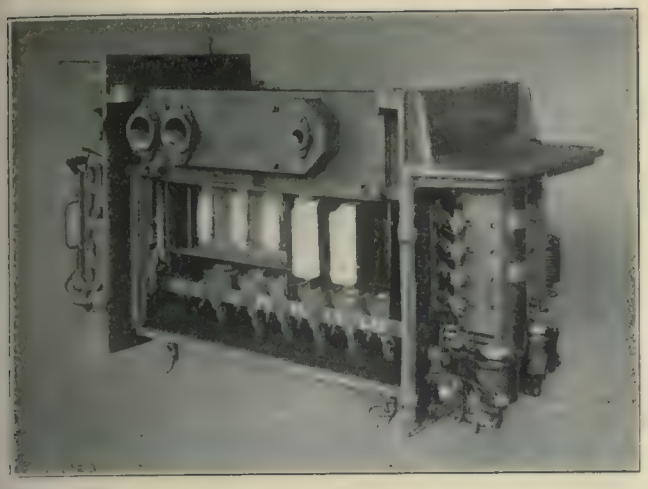


NEW YORK MUNICIPAL CAR—INTERIOR OF CONTROL CAB WITH CURTAIN RAISED

Note projection of motorman's seat, which is hinged to back of passenger seat.

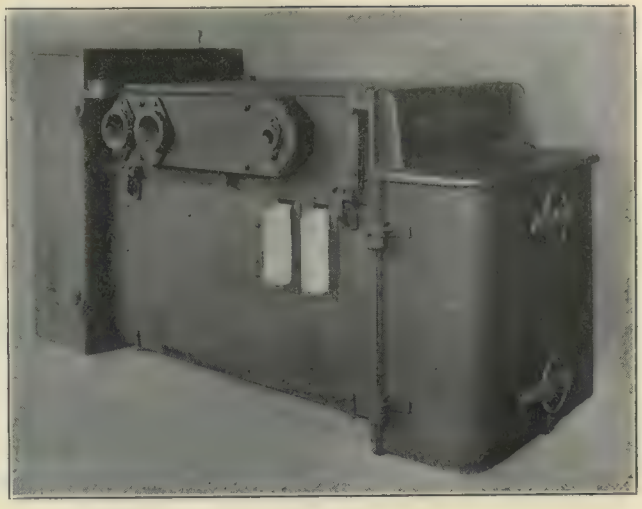
As the motors are of self-ventilating type special care was taken to prevent, as far as possible, dust from entering the bearings or wearing surfaces, dust guards being used at exposed points. Further, the axles are entirely inclosed in a shield to exclude dust from the inner ends of the bearings.

Safety straps are provided to prevent the fall of the lower half of the gear case should the nuts from the clamping bolts be lost. The gears and pinions are



NEW YORK MUNICIPAL CAR—SWITCH GROUP-CONTROL BOX WITH WIRING AND PIPING COMPLETE, OPENED TO SHOW THE MAIN SWITCHES AND PK HEAD

J, G, J R and M2 are main bridging switches for going from series to parallel.
LS-1 and LS-2 are circuit-breaker switches which open on overloads and short-circuits.



NEW YORK MUNICIPAL CAR—SWITCH GROUP-CONTROL BOX CLOSED WITH EXTENDED ARC CHUTES OF CIRCUIT-BREAKER SWITCHES EXPOSED

made of Grade F forged steel and have a ratio of 61:22. The gearing has teeth with a stub profile to meet the severe conditions anticipated.

CONTROL

The control system is designated by its manufacturer, the Westinghouse Electric & Manufacturing Company, as Type 100 ABF. While it represents no great change in principle from a combination of the Westinghouse ABF and PK types of control, old elements have been combined in new ways and special duties have been added, as hereinafter detailed.

In this control the following features have been met for the first time:

First—Combined design, which includes provision for the use of the storage battery furnished for emergency car lighting, common use of apparatus of the brake and electrical equipment, provision for signal and other functions in the control equipment and particular adaptability to the use of automatic electric couplers.

Second—Selective acceleration, the current input being determined by the load.

Third—Operation of sixteen motor cars from a common train line.

Fourth—Use of a common eighteen-wire train line, including provision for auxiliary circuits.

Fifth—The combination of all control apparatus in a single box to obtain the lowest weight and the simplest inspection.

The company considered also the use of control current taken direct from the 600-volt line, but it decided in favor of the 34-volt battery train line for the following reasons:

First—In a 600-volt train line if the power is off the first car, none is available for operating the control for the rest of the train.

Second—Since the brake actuating circuits should be independent of line voltage, it would be objectionable to have a 600-volt control circuit in a common train line with the low-voltage brake circuit.

Third—The use of the battery permits the bucking of motors for emergency braking if the line power fails.

Fourth—Low voltage secures greater freedom than line voltage from derangement of circuits such as those due to grounding and short-circuits.

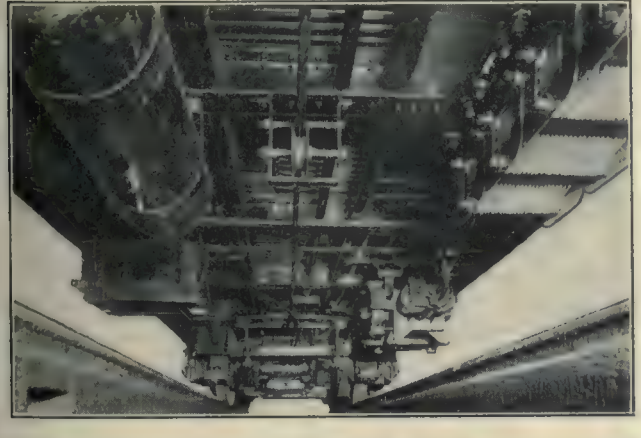
Fifth—A material saving in the cost of control power is secured.

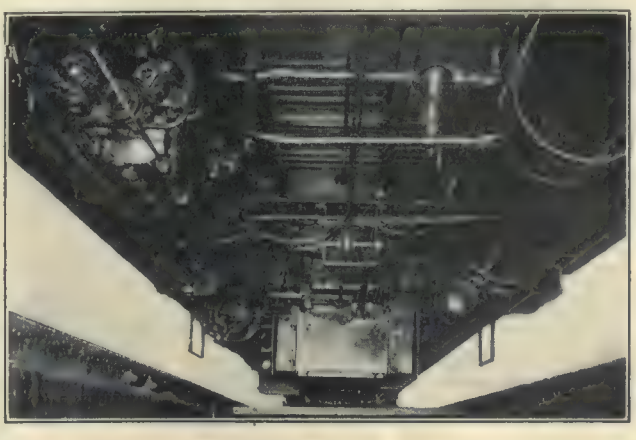
Sixth—Installation is simpler, with the elimination of switches, fuses and resistance elements.

Seventh—There is greater certainty of reliable operation of a low voltage automatic electric coupler.

Eighth—There are no high-voltage connections in the control apparatus above the floor of the car.

Ninth—The storage battery required for emergency lighting and brake control can, without change, supply power for the control purposes.





NEW YORK MUNICIPAL CAR—TWO VIEWS OF THE UNDERFRAME, SHOWING ARRANGEMENT OF AIR AND ELECTRICAL APPARATUS AND THE LAYOUT OF THE CONDUIT

Tenth—Simpler design and installation of accessory apparatus, such as automatic electric couplers, is secured.

Eleventh—The form and design of apparatus and contacts for handling the control circuit are simpler, with the elimination of burnouts on the master controllers and interlock fingers.

BATTERY AND TRAIN LINE

In order to make the battery circuit available for signal lights, door circuit interlocks and to insure correct operation for a maximum possible train length of 1075 ft. the control battery had to be raised from the old standard of 14 volts to 34 volts. The cross-section of the train wires was also increased to avoid excessive drop, each conductor in the eighteen-conductor train line consisting of seven strands of No. 24 wire. The door signal circuit involves the use of train wires which extend in series to a distance equivalent to more than twice the train length.

All control circuits are energized from storage batteries on each car, all of which are permanently grounded on the negative side. The valve magnets require approximately 1.5 amp per car when the motors are in series, and 1.8 amp per car when the motors are in parallel. The storage battery has an estimated capacity of not less than 20 amp-hr. Charging current is available from the compressor during operation. Therefore the battery is mainly for emergency lighting, end and rear marker lights and for the operation of the electro-pneumatic brake circuit.

A total of eighteen wires is included in the train line. disposed as follows: Battery positive, one; brakes and speed control, five; local signal circuits between cars, one; starting signal and door interlock circuits, one; control circuits, seven; extra, three; total, eighteen.

The train line has three junction boxes, and includes wires for the operation of the magnet valves of the air-brake system, suitable outlets being provided for the circuits to the brake apparatus in the center of the car, and for the engineer's valves at each end. This includes provision for the automatic speed control device and for synchronizing the compressor governors.

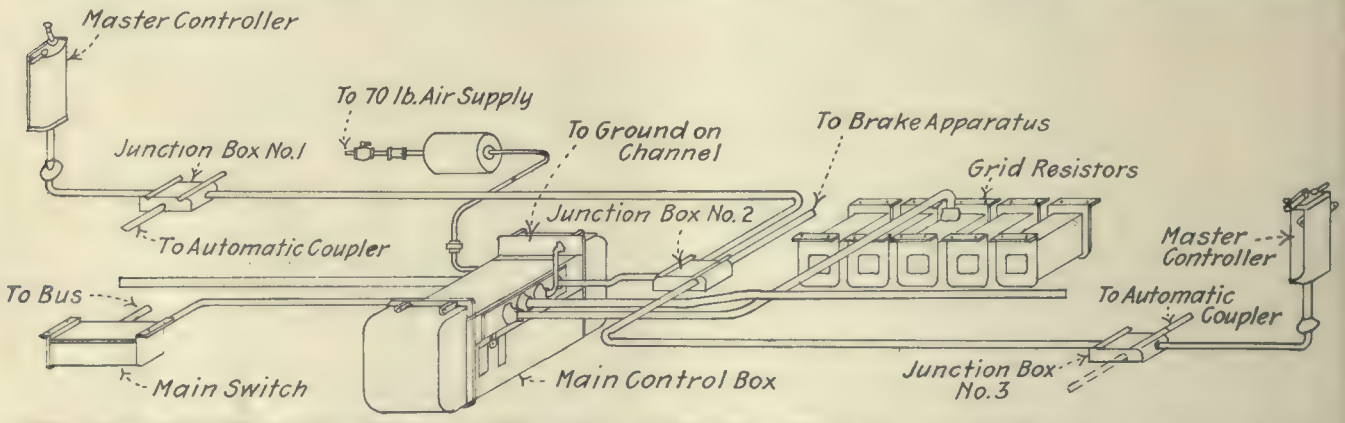
The air supply for the operation of the switching apparatus and the reverser of the control box is taken from the common air brake supply outside the reducing valve of the air-brake system.

With the reverse drum of the master controller in either the forward or the reverse position, the battery plus circuit is completed to the main drum of the controller, which in turn energizes the series wire, the progression wire and the multiple wire, on the first, second and third notches of the controller, respectively. On the first notch the main drum also completes the battery plus circuit for the operation of the reverser magnets to throw the reverse drum to the desired position.

The interlocking on the main switches, reversers and the commutating switch is such that all operation must take place in the sequence indicated, and all main circuit apparatus is protected against injury due to the false operation of any part. It is necessary to complete the circuit for three wires at the master controller before power can be applied to the motors. These wires are the series wire, one or the other of the reversing wires, and the wire which is the return circuit for all magnet coils. With this provision and low-voltage control practically absolute insurance is given against any possibility of a faulty connection in the train line which might cause the operation of the train to be taken from the control of the motorman.

THE CONTROL BOX

Another innovation in control equipment was promoted by the customer's specification that all of the usual under-car motive power apparatus, namely, unit switches, commutating switch, reverser, circuit-breaker and relays should be mounted in one box to effect a large saving in the length, weight and cost of conduit; and also to simplify inspection and to avoid shopping a car for several days when overhauling of the main control parts is required.



NEW YORK MUNICIPAL CAR—ORIGINAL SCHEMATIC LAYOUT OF EQUIPMENT AND CONNECTIONS TO MASTER CONTROLLERS AS SUBMITTED BY THE MAKER; THE LAYOUT ON THE CAR IS SOMEWHAT DIFFERENT, BUT THE EQUIPMENT IS THE SAME

This control box includes the following parts:

Two unit switches acting as circuit breakers.
Four unit switches for series paralleling the motor.
One drum type reverser.
One drum type commutating switch.
One limit switch.
One overload trip relay.
One main circuit terminal board.
One control circuit terminal board.

Unit construction is the basis of the switch design, and each switch, magnet, jacket and cylinder may be removed independently of the other parts of the apparatus.

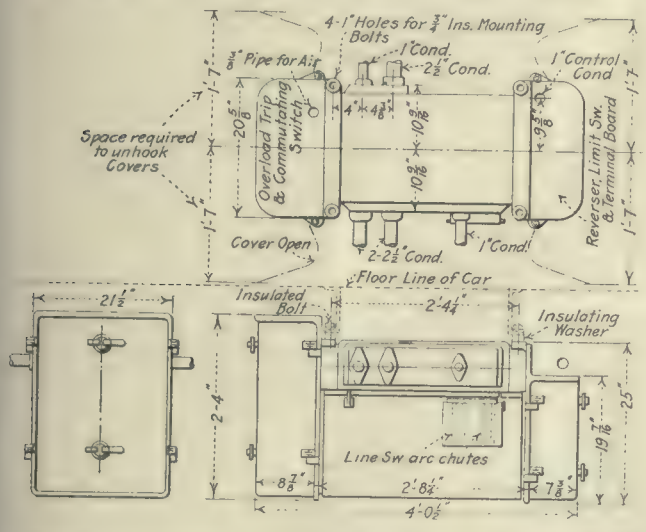
The control is so designed that the upper compartment of the control box accommodates a main circuit junction box. By removing the motor leads and resistance leads from the terminal board and from a few of the studs the main assembly can be lowered from the car by loosening four supporting bolts, following which a new group may be substituted. It is estimated that within thirty minutes one man with the proper hoisting equipment can remove and replace the switch group.

The top frame of the switch group box is constructed to hang from the center sills of the car underframe by means of four lugs, no hanger straps being used. As

shown in one of the under-car views, this box is mounted under the center of the car in such fashion that a man can walk around it on all sides. He is therefore able to remove with ease the doors which cover each compartment and then inspect the group and unit switches and the terminal board above them.

The general layout of the equipment in the control box is shown in part in an accompanying halftone and drawing, and further data on the location of individual parts are presented in the following paragraphs.

The current limit relay is placed alongside the reverser while the 34-volt terminal board is placed beneath the



NEW YORK MUNICIPAL CAR—OUTLINES OF SWITCH GROUP, PK HEAD AND REVERSER

limit switch at the reverser end of the switch group. To this board is brought the conduit through which the control wires are run. All the necessary wiring connections for the motive power circuits were made at the factory, the only job left to the user being the attachment of ten motor leads, eight resistance leads, eight control wires, one ground lead and one trolley lead.

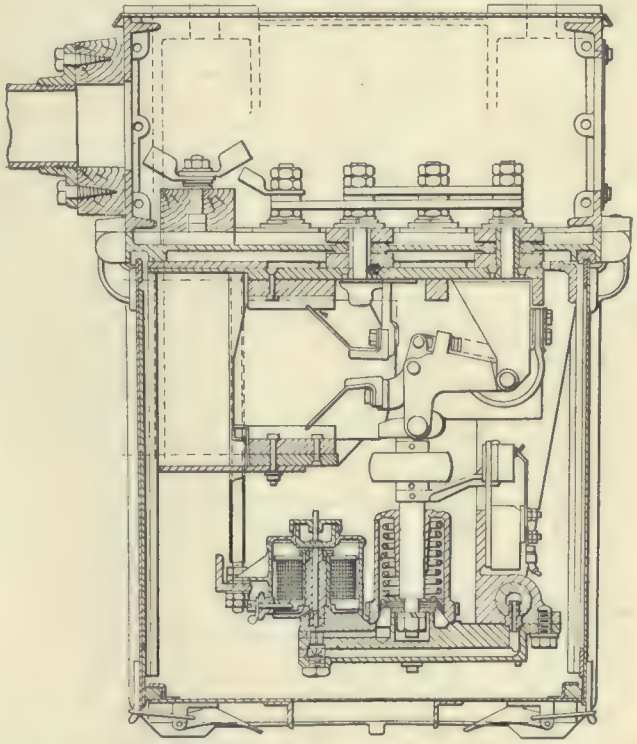
The overload trip relay is mounted next to the limit switch and consists of a plunger actuated by an arm which lifts at a predetermined current in the trip coil. The relay is calibrated in five steps at 100-amp intervals, starting with 450 amp which is approximately twice the one-hour rating of the motor. Contact disks on the plunger open the control circuits to all switches, and these circuits are re-established by unlatching the plunger by means of the reset coil, which may be energized by pressing a button in the top of the master controller after the main handle has been returned to the off position.

On the opposite end of the group of switches is mounted the PK head. The double air cylinder operating this drum is controlled by the unbalanced pressure system whereby the drum is moved from notch to notch under the control of the limit switch. Full pressure of air is maintained in both cylinders, and is intermittently exhausted from one side in order to allow the drum to move from notch to notch. After the drum has advanced, cutting out resistance and changing the field circuits to normal field in series, it returns to the first position after the closing of the *J* switch and advances again after the bridging and parallel connection has been made by the unit switches.

It will be noted that in normal operation no arcs can be broken on the commutating switch and drum, since the main switches are so arranged that no current is passing through the resistance fingers at a time when they are leaving the ground. However, a magnetic blowout is provided to protect the field fingers in case a motor-lead becomes open-circuited. In passing from series to parallel, the *J* switch is closed, thus short-circuiting all resistance before the drum falls back to the first position, and in shutting off from any position on the master controller all the unit switches open before the drum starts to move backward.

For the specific manipulation of the main circuits, six steps are provided in series and four in multiple, with closed circuit or bridging transition between series and multiple to insure uniform acceleration. Each contact with this method carries the current for a single motor only. The two switches which are used as circuit breakers are isolated and have a separate vent for the expulsion of the arc to atmosphere. They differ from the other unit switches only in the use of extended arc chutes, thus making all switch parts interchangeable. The remaining four unit switches establish the motor circuit connection to secure the series-parallel connection. In the operation of the overload trip all these switches open at the same time.

For the minor changes in the motor circuit the PK head is used. The PK contacts care simply for changes



NEW YORK MUNICIPAL CAR—CROSS-SECTION THROUGH UNIT SWITCHES

in resistance and for the changes in the field connections. They carry current for a single motor only. The adoption of this modified form of PK equipment eliminated eight control switches, made possible the use of a control box 4 ft. in length instead of 6 ft., and reduced the weight of the switch group to 850 lb.

The course of the circuit is as follows:

From the 500-amp position of the knife-switch connection to the current collectors, the circuit passes directly to the control box and to the overload trip. From the trip the circuit divides, passing through the two circuit-breaker switches, and then through each of the two motors with their starting resistance, and to the ground connection on the car body.

As shown on the main schematic diagram the circuit passes through *LS*-1 on the first notch; through the switching resistance; the No. 1 motor; the main starting resistance; through the *JR* switch; the resistance

for the No. 2 motor, and through the No. 2 motor and the limit switch to ground. *LS*-2 closes for the second notch, and the remaining notches to full series are secured by cutting out the main starting resistance.

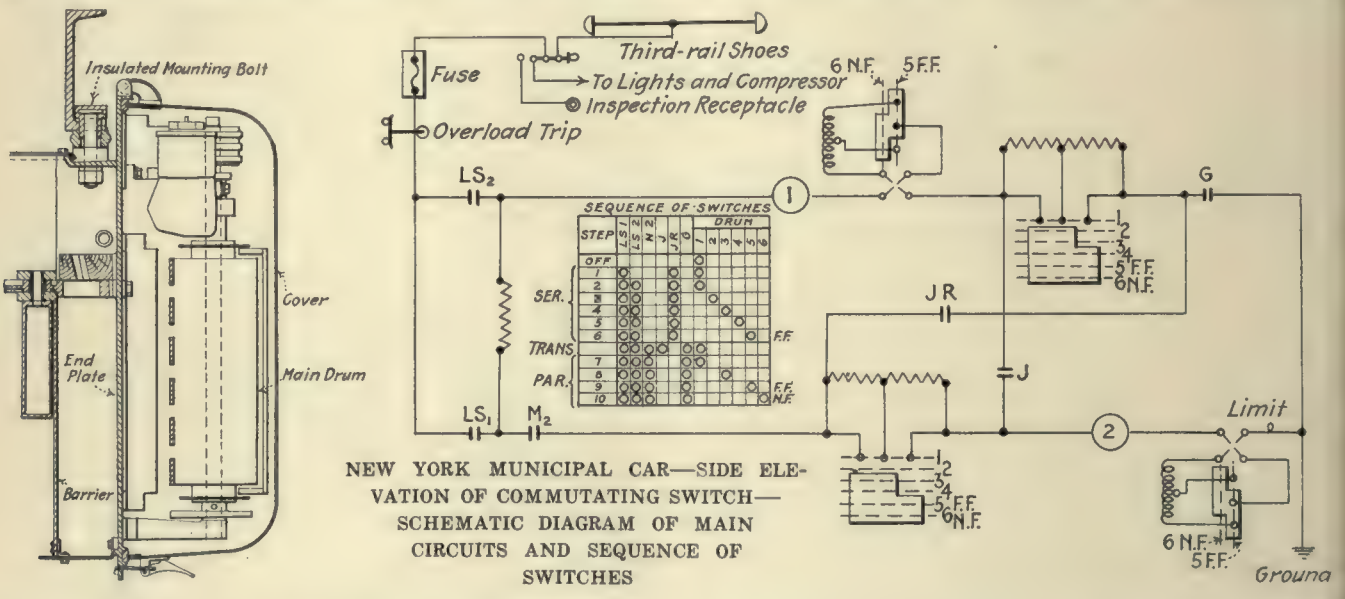
In passing from series to parallel, the bridging transition circuit is formed through the switches *M*-2, *J* and *G*. After the *J* switch is opened, the motors are in parallel with resistance, the resistance is then cut out step by step and the field connections changed to normal field in the same manner as was done in the series connection.

The line relay, which is placed on a switchboard located between the two center doors instead of being in the control box, is energized directly from the 600-volt circuit. Its contact disk is so connected in the control circuit that all unit switches open whenever power fails, permitting the control to advance in regular sequence when power is restored, without the master controller being returned to the off position. The relay is so adjusted that it will lift at approximately 350 volts and drop at approximately 150 volts. With this range, the relay has sufficient travel to insure positive action of the contacts and contact disk. The line relay also has auxiliary contacts to light the emergency lamps.

In addition to the usual contacts and fingers for the control circuit, the master controller has interlock contacts mounted on the reversing-drum shaft to provide for three auxiliary contacts. Two of these contacts are for signals and one is for tail-lights. These unusual features will be described in a later article in connection with the door signals, marker lights and train line coupler. The reverse drum acts as a switch to close the battery circuit to the control.

Still another new feature is that both polarities of the control circuits are broken at the controller. This is accomplished by running an extra train line wire for the negative side of the magnet coils. As no attempt has been made to ground the return circuit of the control, local grounds cannot create false circuits or cause false operation.

The line relay cut-out will permit the feeding up of the control when power is off the line and the bucking of the motors, as an emergency method of stopping the train should power be off the line and the air brake fail.



NEW YORK MUNICIPAL CAR—SIDE ELEVATION OF COMMUTATING SWITCH—SCHEMATIC DIAGRAM OF MAIN CIRCUITS AND SEQUENCE OF SWITCHES

MASTER CONTROLLER

The master controller is equipped with the usual three notches for switching, series and multiple positions and with a separate reversing drum and the usual deadman's handle. The movement of the reverser handle to an operating position energizes the control-circuit supply, thereby eliminating an auxiliary cut-out switch. Inserted in the case at the right-hand side of the controller are an emergency cut-out switch for the 34-volt control circuit, a circuit-breaker reset button, a line relay cut-out button and marker-light switch button.

The deadman's handle on this controller acts by the application of battery current to the emergency train line wire. This application instantly energizes all emergency valves in the train upon the relaxation of the motorman's grasp at any position of the handle, whether the reverser is forward or reverse. By the same operation a special device completely cuts off power from the propulsion circuits.

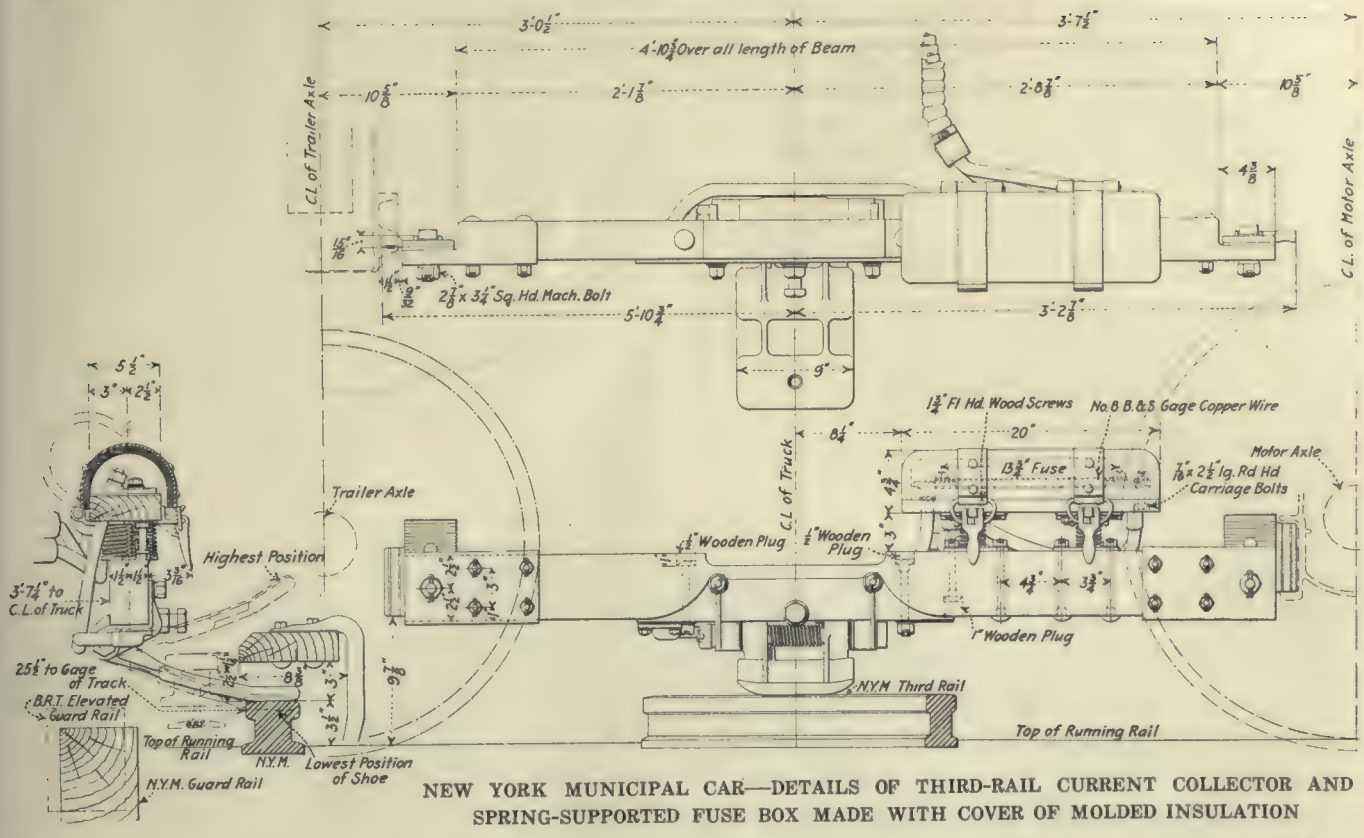
The marker-light switch was added to the controller by the New York Municipal Railway. The signal lights which indicate that all doors have been closed are also installed in the master controller to avoid too many individual pieces of apparatus in the cab.

SELECTIVE ACCELERATION

In order to obtain the same rate of acceleration with all passenger loads from minima to maxima there is provided an extra winding on the limit switch which modifies the current input to the motors. The amount of current through this winding is controlled from a switch operated in connection with the empty and load brake mechanism. The adjustment of this mechanism corresponds directly to the deflection of the bolster springs under load.

CONDUIT

In the earlier installations of equipment separate conduits were used for each of the wires in the main circuits. In the present installation, however, multi-conductor cables are used. Consequently one large conduit pipe serves for each set of motor leads. Likewise, all resistance leads are formed into a cable and are carried from the switch group to the resistors through a single conduit with a Crouse-Hinds eight-conductor outlet. In order to reduce the weight of the conduit itself, material of the following character was used: For straight runs inside the car, circular steel tubing of 1/32-in. wall, inside diameter corresponding to standard pipe sizes, fitted at each end with one Ellcon conduit fitting, locknuts and spring lock washers; for straight runs under the car sherardized steel tube with suitable thickness of wall and inside diameter to correspond to standard



NEW YORK MUNICIPAL CAR—DETAILS OF THIRD-RAIL CURRENT COLLECTOR AND SPRING-SUPPORTED FUSE BOX MADE WITH COVER OF MOLDED INSULATION

pipe size fitted at each end with one Ellcon conduit fitting, lock-nuts and spring lock washers; for runs requiring bends, "Sherarduct" with lock-nuts and spring lock washers. By the use of this system of conduit, the weight was reduced to a great extent.

THIRD-RAIL COLLECTOR AND KNIFE SWITCH

The current collector is the usual type of overrunning shoe with rack adjustment at the ends but with a bolt adjustment in the center to take care of finer adjust-



NEW YORK MUNICIPAL CAR—MOTOR TRUCK CARRYING FUSE BOX WITH COVER OF MOLDED INSULATION

ments within a range of 1 in. The terminals are somewhat unusual in having a taper fit so that by removing a nut the connection may be slipped off very readily. In order to eliminate the breakage of fuses and connections due to vibration, the fuse box is spring-supported. Another feature is that the cover of the box is formed of a single arch of Hemmit molded insulation. Instead of building the box of wood with joints and fastenings, in the present construction only the base of the box is of wood, and this is covered with transite. The shoe beam is supported from the journal boxes with proper link action for any difference in movement between the two boxes from which it is carried. It has no permanent fastenings but is slipped into 1⅝-in. deep side pockets on the side of each box. Between each shoe-beam rack and journal box is a compression spring to prevent rattling of the beam. Armored cable is used for the connections to the car body, but rigid conduit is employed as the conductor between the shoe-beams of the same truck. Castle nuts with cotters are used throughout.

In conclusion it should be noted that the main knife switch not only has a 500-amp position for the connection to the current collectors described, but also a 75-amp position. With the switch in the 75-amp position the light, compressor and heater circuits are connected to an inspection attachment within the switch box, through which line voltage may be plugged from any convenient point for inspection purposes when it is desired to have the source of power disconnected from the main circuit. This main knife switch is of single-pole double-throw break type.

Qualifications of a Railway President

In a recent lecture delivered in the city of New York, H. A. Bullock, secretary New York Municipal Railway Corporation, outlined the following as the qualities which must be possessed by the successful modern railway president. He must have the ability to formulate sound policy and to present it to the directors or the stockholders for approval; to grasp the financial problems of an enterprise so as to keep the directors accurately and intelligently advised of the results expressed in gross and net earnings, as affected by a continuance of the existing investment of a railroad property, the investment of new money by way of additions or extensions and the diminution of the existing investments by means of the abandonment or sale of any part of the railroad's operating system; to comprehend the practical operating problems as presented to him; to give practical interpretation to technical propositions made from time to time; to retain the mastery of the administrative work of the property, and to interpret the difficult problems which the railroad has to meet.

Prof. S. J. Lochner, University of Akron, has inaugurated a series of lectures on "Elementary Electricity," discussing this subject to its conclusion. The lectures are free to anyone who wishes to attend. They are given on Tuesday and Friday of each week at the university.

Transportation Exhibits at San Francisco

The Electric Railway Exhibits at the Panama-Pacific Exposition Divided Between Buildings, the Palaces of Transportation and of Machinery—The Transportation Exhibits Are Briefly Described

"Educational" is the theme upon which the exhibits at the Panama-Pacific International Exposition have been planned and assembled. It has been the aim to make displays contemporaneous rather than historical, but development and progress in modes of transportation during the past decade are effectively portrayed. It is to be noted that much of the machinery and electrical apparatus is shown in actual operation, and where feasible mechanisms are cut in sections to expose the working parts. Common to all the transportation exhibits there is the tendency to exemplify fundamental principles and to bring out the essential features and functions of the apparatus so as to facilitate explanation and study.

A well-known American writer has pronounced the exposition to be "the most economical" of any he had ever seen, and those who heard the remark, thinking of the $50,000,000 which the exposition has cost and the maintenance items, such as $1,000 per night for illumination, asked him to explain. He did so by pointing out that it was economical from the standpoint of the visitor who could acquire in a short time at this exposition more information and a more accurate and practical knowledge of modern processes and machines than had ever before been possible. And probably it is for this reason as much as because the exposition is so beautiful and truly universal that the attendance is so large, in spite of conditions that might have been thought to lessen interest in it. At the end of the first week of the exposition, when this article was written, the total attendance had been 618,998, as against 253,577 at Chicago and 325,144 at the St. Louis Exposition during the corresponding periods.



PANAMA-PACIFIC EXPOSITION—GENERAL VIEW OF GROUNDS AND BUILDINGS

Palace of Transportation

The field of transportation has perhaps more progress to record and more to show that is new than most of the departments into which exhibits are classified. In the Palace of Transportation are to be seen representations and examples of every phase of modern methods of transportation, and these are designed not merely to impress the layman but to instruct and stimulate the ideas of the man familiar with the field. For instance, the electric railway manager will find great interest in comparing the inventions and appliances for safeguarding life and property, he will examine the latest types of car equipment and will profit much by an inspection of the wide variety of railway supplies in which manufacturers have taken pride in presenting their very latest productions. The range of exhibits extends from a time-card file to a large articulated electric locomotive and covers both freight and passenger



PANAMA-PACIFIC EXPOSITION—PALACE OF TRANSPORTATION FROM THE MARINE GARDENS

rolling stock. Several of the companies represented have added moving picture equipment to their displays in order to show to better advantage actual operating conditions.

Although it is not feasible to chronicle here even a partial list of the more interesting exhibits, it is worth while to note, by example, the general tone of displays. For instance, in the center of the building is a standard 4000-hp Pennsylvania electric locomotive exhibited by the Westinghouse company. This locomotive is shown on a turntable which revolves so that spectators can see all sides of it. Types PK and HL control are also shown. In the General Electric exhibit there are five types of locomotives, complete and ready for operation in as many classes of service. Two Type MK control equipments are mounted ready for service, connected by standard control jumpers and air-brake equipment for train operation. Each of these is provided with a GE-247 motor mounted on trucks beneath the racks, and the whole represents the complete underframing of a two-car train so assembled that the operation and connections are easily observed and can be compared with illuminated diagrams on either side of the racks.

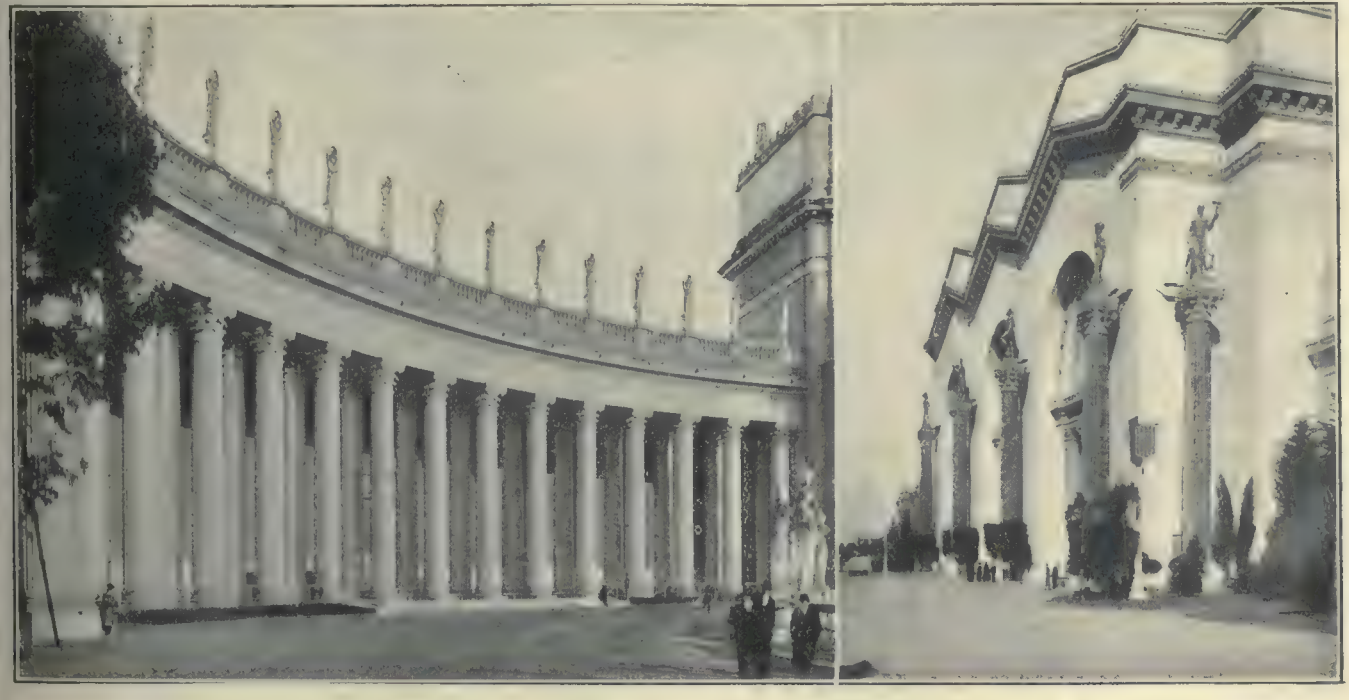
A lightning arrester demonstrating the dissipation of high-voltage charges through a device connected in 600-volt, 1200-volt or 1500-volt circuits without interrupting normal service may attract the visitors' attention, and next there will be an Edison storage-battery locomotive equipped also with a trolley arm; beyond is a newly developed electro-pneumatic brake demonstrating its operation on an interurban train, and next may be the stereomotograph showing on a ground-glass screen the most interesting features of power-house and substation apparatus which the exhibitor could collect and ship to his booth. Other exhibits in this building are track special work, steel ties, car wheels and maintenance of way and construction equipment.

However, the foregoing has touched on only typical examples in that portion of this building devoted to electric railway interests. There is also much space devoted to other methods of transportation; fourteen steam locomotives are shown and 12,000 sq. ft. of space is occupied by automobile exhibits. Nor are all of the displays of interest to the electric railway field within the Palace of Transportation, for the scope of exhibits in the Palace of Machinery includes, for example, perhaps even more electrical equipment covering motors of all types, as well as luminous and measuring apparatus. Here there are also a variety of steam generators and accessory appliances, together with internal combustion engines in operation which are attracting special attention as applied to the generation of electric power.

A list of some of the principal exhibits by manufacturers in these two buildings is found on another page in this issue.



PANAMA-PACIFIC EXPOSITION—ILLUMINATION OF PALACE OF TRANSPORTATION



PANAMA-PACIFIC EXPOSITION—FAÇADES OF PALACES OF TRANSPORTATION AND MACHINERY

Electric Railway Statistics

Comparison by Bureau of Fare Research with Statistics of Steam Railroads, Bank Clearings and Building Construction for a Period of Seven Months from June, 1914, to January, 1915

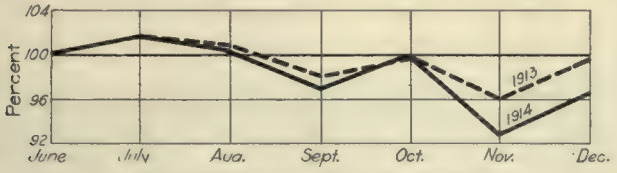
In the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 23, page 183, there appeared a report from F. W. Doolittle, director of the bureau of fare research of the American Electric Railway Association, containing statistics from various sources showing the trend of electric railway earnings, steam railroad earnings, bank clearings and building permits for the months of June, July, August and September, 1914. Mr. Doolittle has continued this study and has just completed seven months' comparisons by including the months of October, November and December. The following statements present his conclusions.

The accompanying diagrams show the trend of the items considered during the last seven months of 1914. As before, there was no adequate means of making a comparison between electric railway earnings in 1914 and in 1913, so that the bureau has confined its observations to a running comparison, beginning with the month of June. In connection with the diagrams, the relations shown in the following table should be borne in mind:

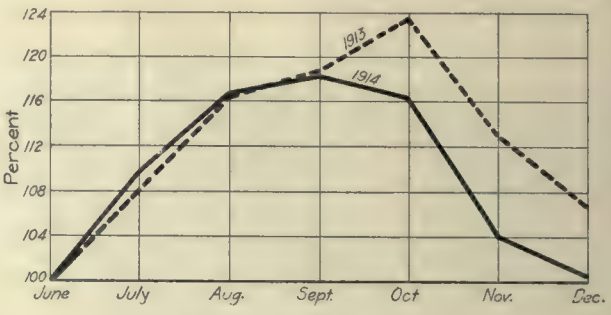
	June to December inclusive, 1914	1913	1914 in per cent of 1913
Gross earnings — steam roads	$1,766,383,915	$1,897,499,370	93.09
Bank clearings	83,279,767,186	97,631,749,952	85.30
Value of building permits, (50 cities in 24 states)	309,052,330	359,450,023	85.98

Such figures as are available indicate a relatively small seasonal variation in electric railway earnings when the country as a whole is considered. A large variation is unlikely, inasmuch as a very considerable part of the business of every electric railway company come from the residents of the community in which each road operates, and the use by residents is largely determined by necessity and habit. The casual riding by floating population and riding to parks and places of amusement vary from month to month in each city, but when the country as a whole is considered, these variations equalize, and the result is a greater uniformity than is the case with the traffic of steam roads.

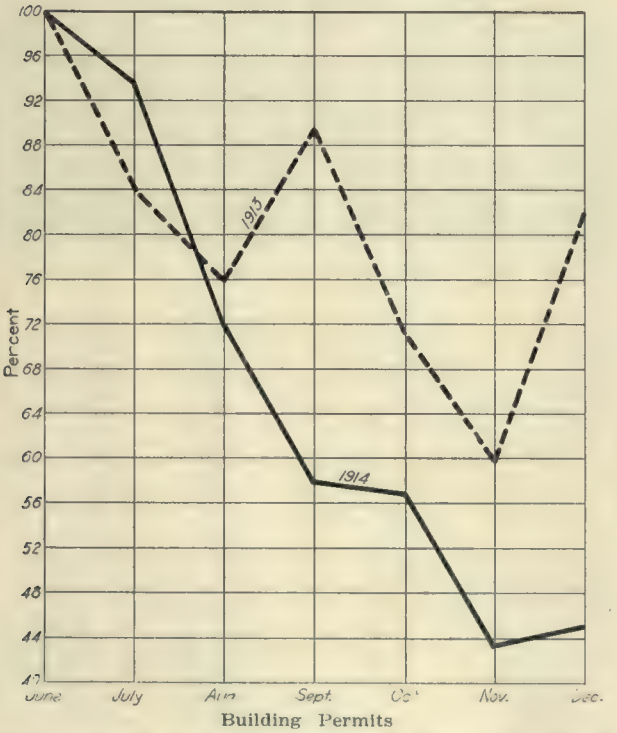
There are available figures covering electric railway operating revenues during the last six months of 1913 for seventy-nine companies, well distributed throughout twenty-one states. These figures are shown graphically in the diagrams as of possible interest, although they are not for the same companies as are included in the figures for 1914. While the 1913 figures are for fewer companies than those included in the 1914 totals, they represent about the same monthly operating revenue. Inasmuch as the 1913 figures begin with July, they are for that month made to coincide, as to the percentage of June, with those of 1914.



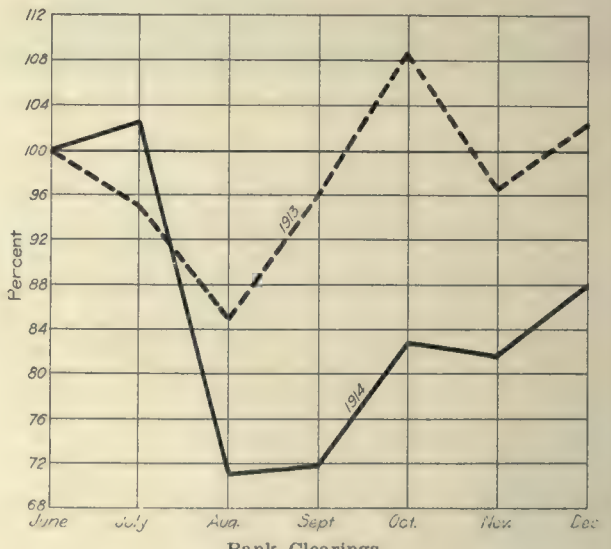
Electric Railway Operating Revenues



Steam Railroad Operating Revenues



Building Permits



Bank Clearings

STATISTICS OF ELECTRIC RAILWAYS, STEAM RAILROADS, BUILDING PERMITS AND BANK CLEARINGS FOR LAST SEVEN MONTHS OF 1913 AND 1914 IN PER CENT OF JUNE FIGURES IN EACH YEAR

TABLE I. OPERATING REVENUES AND EXPENSES OF NINETY-FIVE ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

Month 1914	United States Revenues Amount	United States Revenues Per Cent, June	United States Expenses Amount	United States Expenses Per Cent, June	East Revenues Amount	East Revenues Per Cent, June	East Expenses Amount	East Expenses Per Cent, June	South Revenues Amount	South Revenues Per Cent, June	South Expenses Amount	South Expenses Per Cent, June	West Revenues Amount	West Revenues Per Cent, June	West Expenses Amount	West Expenses Per Cent, June
June	$14,480,768	100.00	$8,765,233	100.00	$9,065,625	100.00	$5,464,759	100.00	$373,831	100.00	$217,461	100.00	$5,041,312	100.00	$3,083,013	100.00
July	14,816,092	102.32	8,802,032	100.42	9,275,197	102.31	5,439,557	99.54	389,328	104.15	226,675	104.24	5,151,567	102.19	3,135 800	101.71
August	14,640,857	101.11	8.554.051	97.59	9,206,150	101.55	5,283,684	96.69	379,754	101.58	220,951	101.60	5,054,953	100.27	3,049,416	98.91
September	14,086,223	97.28	8,280,978	94.48	8,787,396	96.93	5,135,966	93.98	353,198	94.48	211,104	97.08	4,945,629	98.10	2,933,908	95.16
October	14,358,872	99.16	8,502,027	97.00	8,882,022	97.97	5,208 037	95.30	355,805	95.18	244,750	112.55	5,121,045	101.58	3,049,240	98.90
November	13,268,486	91.63	7,948,299	90.68	8,206,637	90.52	4,864,467	89.02	316,957	84.79	197,437	90.79	4,744,892	94.12	2,886,395	93.62
December	13,704,117	94.64	8,136,271	92.83	8,501,471	93.78	4,940,310	90.40	334,996	89.61	191,469	88.05	4,867,650	96.56	3,004,492	97.45

TABLE II. OPERATING REVENUES OF 105 ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

Month 1914	United States Amount	United States Per Cent, June	East Amount	East Per Cent, June	South Amount	South Per Cent, June	West Amount	West Per Cent, June
June	$19,113,164	100.00	$13,698,021	100.00	$373,831	100.00	$5,041,312	100.00
July	19,459,649	101.81	13,918,754	101.61	389,328	104.15	5,151,567	102.19
August	19,162,513	100.26	13,727,806	100.22	379,754	101.58	5,054,953	100.27
September	18,486,986	96.72	13,188,159	96.28	353,198	94.48	4,945,629	98.10
October	19,100,164	99.93	13,623,314	99.45	355,805	95.18	5,121,045	101.58
November	17,687,749	92.54	12,625,900	92.17	316,957	84.79	4,744,892	94.12
December	18,393,919	96.24	13,191,273	96.30	334,996	89.61	4,867,650	96.56

TABLE III. COMPARATIVE VARIATIONS OF BANK CLEARINGS*

Month	1914 Amount (last 000,000 omitted)	1914 Per cent of June	1913 Amount (last 000,000 omitted)	1913 Per cent of June	1912 Amount (last 000,000 omitted)	1912 Per cent of June
June	$13,957	100.00	$14,285	100.00	$14,023	100.00
July	14,298	102.44	13,606	95.25	13,914	99.22
August	9,893	70.88	12,108	84.76	12,418	88.55
September	10,004	71.68	13,728	96.11	14,168	101.04
October	11,604	83.14	15,545	108.82	16,823	119.97
November	11,154	79.92	13,762	96.34	14,470	103.19
December	12,365	88.59	14,594	102.17	15,842	112.97
Total	$83,279		$97,631		$101,660	

*Compiled from figures in *New York Evening Post.*

TABLE IV. VALUE OF BUILDING PERMITS*

Month, 1914	United States Per cent of Same month, 1913	United States Per cent of June, 1914	East Per cent of Same month, 1913	East Per cent of June, 1914	South Per cent of Same month, 1913	South Per cent of June, 1914	West Per cent of Same month, 1913	West Per cent of June, 1914
June	103.00	100.00	105.96	100.00	77.82	100.00	97.53	100.00
July	115.23	93.86	95.76	73.64	150.32	116.44	167.84	166.48
August	97.58	71.83	105.95	72.15	88.71	79.07	75.59	69.53
September	66.33	57.73	67.38	57.40	65.44	43.57	62.99	61.11
October	82.80	56.96	81.57	54.96	71.48	47.97	88.55	65.84
November	75.11	43.37	78.09	43.60	57.80	36.39	67.91	43.56
December	56.68	45.16	50.58	42.45	83.44	35.46	81.99	56.79

*Compiled from figures in *Engineering News.*

TABLE V. GROSS REVENUES OF STEAM ROADS—UNITED STATES*

Month	1914	Per cent of June	1913	Per cent of June
June	$230,751,850	100.00	$241,107,727	100.00
July	252,231,248	109.31	261,803,011	108.58
August	269,593,446	116.83	280,919,858	116.51
September	272,992,901	118.31	285,850,745	118.56
October	269,325,262	116.72	298,066,118	123.62
November	240,235,841	104.11	272,882,181	113.18
December	231,253,367	100.22	256,869,730	106.54
Total	$1,766,383,915		$1,897,499,370	

*Compiled from figures in *Commercial & Financial Chronicle.*

It is of interest to note in connection with the diagrams that for the steam roads, the earnings during July, August and September bear very closely the same relation to June in 1914 as in 1913. This shows that these roads felt the effects of the acute disturbances of the past summer first in October. Building operations first showed a material variation in the percentage of June during the month of September, while the amount of bank clearings, a highly sensitive barometer, showed a sharp drop in the first month following the beginning of the European war. By far the smallest fluctuation from month to month, both in 1913 and in 1914, is shown by electric railway earnings. In addition, the electric railway earnings for 1914 show a smaller variation from those in 1913 than is indicated in the other items assembled for comparison, although it does not follow that this small decrease in gross below 1913 indicates a relatively small decrease in net, because the electric railway business is conducted on a margin very much smaller than that of most commercial enterprises.

The accompanying tables are presented as of general interest.

President Harmer on Springfield (Mass.) Electrolysis Report

A Brief Analysis of the Bureau of Standards' Recent Report. Together with the Attitude of the Railway Toward It

President J. T. Harmer of the Springfield (Mass.) Street Railway has announced that the Stone & Webster Engineering Corporation, Boston, Mass., has been engaged to make a thorough study of the electrolysis report recently completed by the bureau of standards, with recommendations as to future power developments. The report was in three parts, as below:

Part 1 discussed test data obtained in the survey, stating that the over-all potential measurements are too high and that they should average for a twenty-four-hour period not over 3 or 4 volts, the potential gradient not exceeding 0.3 volt per thousand feet of track. Small differences of potential between pipes and track and between lead sheaths and other underground structures were found, with small currents in water and gas mains. None of the data shows any damage to underground structures, although there was a small voltage drop around the insulated joint in the 30-in. Little River water main. The report stated that "in general conditions at present cannot be regarded as alarming nor calling for hasty or precipitate action."

Part 2 contained a general discussion of electrolysis mitigation, based on the data given in Part 1. It appears, said Mr. Harmer, to favor insulated joints in water and gas pipes after other precautions have been taken, and it objects strongly to pipe drainage. As a remedy, a four-substation layout is recommended, such that the average twenty-four-hour potential gradient shall not exceed 0.45 volt per thousand feet of track. Mr. Harmer points out that owing to the lack of experience in this country with railway installations in which voltage drops in the negative return have been maintained low enough to give substantial freedom from electrolysis troubles, the bureau has based its conclusions largely on the standards laid down in England and Germany. The company feels that these conclusions should be given independent expert engineering study.

Part 3 outlined four possible methods of eliminating electrolysis difficulties in Springfield. The first provided that the railway company enter into an arrangement with the Turners Falls hydroelectric power interests, whereby the latter would take over the Margaret Street steam plant of the railway in Springfield at its present cash value and enter into a contract whereby the power company would supply power from substations to be built and operated by the railway company, three in the city of Springfield and one in West Springfield. The bureau concluded that this plan is the most advantageous. As one alternative the bureau recommended the installation by the street railway of additional negative return feeders without any change in the present distribution system, involving the expenditure of several hundred thousand dollars with little direct benefit to the company. Another involved the remodeling of the Margaret Street power station from a d.c. to an a.c. generating plant, the substations to be erected by the railway. This would cost more than the first plan. A third alternative was the installation of one substation

in Springfield and one in West Springfield, using the Margaret Street plant, operated by the hydroelectric company as a combined a.c. plant and substation, to supply the remainder of the load. This plan also would be more expensive than the first.

President Harmer points out that the Margaret Street station is well equipped and produces power at a satisfactory cost, and with purchases of power now being made from other companies efficiently fills the present requirements. For some time, however, it has been recognized by the company that with future expansion some changes might be necessary in the system of power distribution, and various studies have been made, but lack of funds has prevented any action. Mr. Harmer states that it cannot be expected that the street railway company would or could, without the best advice, abandon a plant valued by the city at $700,000, and states that the estimate by the bureau of standards as to the price to be paid by the purchaser might not be satisfactory either to the railway company or the purchaser. As the property is covered by the street railway company's mortgage, a sale would not appear to be such a simple matter as might be inferred from the report, although eventually it might be found the proper course to pursue.

Prior to the investigation by the bureau, the company was discussing negotiations and proposed methods of power utilization with the Turners Falls company, but these were suspended when it became evident that the bureau would go beyond a mere statement of conditions. Mr. Harmer says that when the engagement of the bureau of standards was contemplated, the railway company declined to share in the expense because it had previously expended a large amount of money in examining and rebonding tracks, and any suggestions involving expense would fall most heavily upon it. Every facility, however, was afforded the representatives of the bureau in its investigation.

Insulation for Railway Motors

Westinghouse Designer Analyzes Materials and Methods Used in Armature and Field Coil Insulation

In the current issue of the *Electric Journal* R. E. Hellmund discusses the characteristics desirable in insulating materials for railway motors, briefly describes the materials now available and explains how these materials are selected and applied. As desirable properties he mentioned ability to stand mechanical stresses and vibration without cracking or chafing; flexibility and strength to withstand bending and pounding during manufacture or repair; freedom from deterioration under high temperature to the extent of losing mechanical and insulating qualities; non-shrinking character on application of heat or mechanical stress; compactness; moisture proofness; high dielectric strength; smoothness of surface, and low cost. No insulating material possesses all of these desirable qualities and the best that can be done is a compromise.

Available insulating materials are divided into two classes; first, mineral materials like mica and asbestos which withstand comparatively high temperatures and, second, fibrous materials like cotton, paper, linen, etc., which will withstand only comparatively low temperatures. Unfortunately the materials of the first class are lacking in some respects. Mica, for instance, if subjected to chafing will pulverize, and it is practically impossible to apply it anywhere in its natural form except in flat sheets. It is also very expensive. As a result pure mica can practically be used only as an insulation between the segments of commutators, and even here its use has been practically abandoned because the natural mica is rarely found in sufficiently large plates of uniform quality. Pure asbestos is practically unavailable for use in railway motors in the small thicknesses required. The best substitute for pure mica and asbestos are materials consisting principally of them with certain supporting or binding materials.

Built-up mica, consisting of small, thin pieces held together by shellac, is used to good advantage for insulation between commutator segments, but care must be taken that the minimum amount of shellac is used, otherwise the material is liable to shrink under pressure and heat. Flat sheets of built-up mica are used also between layers of field coils, and, since the small pieces of mica used are flexible in themselves, it is possible to build up various shapes such, for instance, as the V-ring for commutators.

In applying mica to coils or heavy strap conductors it is necessary also to use some fibrous material like paper or cotton as a base for the mica. It is customary to build up mica on thin sheets of fish paper or Japanese paper, and to wrap the resultant sheet around the straight parts of the armature coils or heavy conductors. It is also customary to build up mica on a thin cotton tape and to use the resultant material for taping coils or heavy conductors. If the amount of paper or tape is small and if the material is applied in such a location, as in an armature slot, so that the mica will remain intact even after the paper or the cotton tape has deteriorated, these materials may be expected to withstand fairly high temperatures. In all of these applications the built-up mica fulfils the requirements except that it is expensive and it is liable to pulverize under vibration.

Asbestos insulation can be applied to wires and small straps with the use of binding materials, but in all these cases, except in that of asbestos tape which can readily be used in taping armature or field coils, the mechanical qualities of these insulations are still quite poor. It is, for instance, very difficult to wind an armature with asbestos-covered wire without injuring the insulation, and while an armature wound with this wire will be less subject to roasting than one wound with cotton-covered wire, it is doubtful whether there is any real gain because of the frequent breakdown caused by the mechanical injuries sustained during winding. Asbestos windings also require much space if used in sufficient thickness, they are not in themselves moisture-proof, they have very low dielectric strength, they do not give a smooth surface, and they are expensive.

Fibrous materials, while they do not withstand high temperature, are advantageous in a good many other respects and are extensively used in railway motors. Cotton insulation is, after all, the only one which can be applied satisfactorily to small conductors such as the wire used in railway motor armatures. Paper products of the various types manufactured for insulating purposes, while not withstanding very high temperatures, serve many good purposes in the insulation of railway motors. Fuller board also is used to advantage in many places.

The impregnating of fibrous and asbestos products with varnishes, gums, bakelite, etc., produces several results: First, the treating materials fill up the pores of the basic material and eliminate moisture; second, the dielectric strength is increased even where there is no moisture to be considered; third, most treating materials assist in producing smooth surfaces; fourth, the heat resistance quality of the basic material is often increased, and, fifth, the filling up of the pores may in certain cases reduce the tendency to shrink. Incidentally the treating materials increase the heat conductivity of the insulation resulting in less difference of temperature between the conductors and the outside.

Syndicated Anti-Railway News

Continuation of Adverse Bulletins—The "Jitneys" Are Now Being Boomed

In an article in the last issue of this paper an account was given of a newspaper syndicate association which suggested to newspaper editors that they start a war on "rotten car service." The offer was made to sell a service of "canned" agitation, and reproductions were published of one of the bulletins sent out advocating an anti-trolley campaign and of two bulletins setting forth the superiority of "jitney" transportation over the electric railway service.

A number of recent bulletins of the same kind of syndicated anti-railway news, issued in form for use by daily papers, have reached the office of this paper. Most of them relate to the "jitney" movement. Several typical ones are published, in part, below. The first is the introductory part of some "special correspondence" from Houston, Tex., and reads as follows:

(Special Correspondence)

HOUSTON, TEX., Feb. 00.—You can't find a straphanger in Houston to-day with a spyglass. A year ago there were more than 20,000 straphangers daily. But nowadays those 20,000 people are paying their nickels to the "jitney" buses—and are riding to and from work in comfortable, cushioned seats, with fresh air filling their lungs and only half the time spent on the trip.

"We've solved the transportation problem," says Steve McCormick, the pioneer Houston "jitney" driver. "My cars are each paying me from $7.50 to $10 over all expenses, and a depreciation charge." McCormick figures that a Ford will last a year or more in the business. "The 'jitney' business is a regular epidemic in America," he says.

Another "Special Correspondence" from Baltimore begins as follows:

"JITNEYS" MARCH FROM COAST TO COAST.

GIRL RUNS FIRST MOSQUITO FLEET IN BALTIMORE; WASHINGTON SOON TO HAVE "JITNEYS" TOO

(Special Correspondence)

BALTIMORE, MD., Feb. 00.—The "jitneys" have invaded the East. The first "jitney" bus on the Atlantic Coast began operating in Baltimore a week ago.

And, as usual, it was a woman who started things. Miss Sarah Henderson, who has been nicknamed, "The Jitney Girl," started the first bus, running from the eastern edge of the city to the City Hall, a distance of twenty-five city blocks. On her first run "The Jitney Girl" cut the time of the trolley line in half. Two buses were put into operation to start the line, and seven passengers constituted the first load, all riding to the City Hall.

In each case the same animus against the local electric railway industry is shown. This is the way the Toledo situation is described, in part:

"JITNEYS" THREATEN RUIN OF TOLEDO TRACTION TRUST!

FEDERAL "TWO-LEGGED" JUDGE CAN'T FINE 'EM AS HE DID NEWSPAPER WHICH ATTACKED STREET RAILWAY MONOPOLY!

TOLEDO, OHIO, Feb. 00.—So strong is the "jitney" bus idea with Toledo people that the city council is already considering a bond issue to establish a municipally-owned and operated system of the popular vehicles. This, although the city last summer voted for municipal ownership of the street car system and an $8,000,000 bond issue to that end is now pending.

Just when the franchises had expired and the people of Toledo believed that a fair settlement might be reached with the company, the corporation took refuge in the United States Court. The City Council has passed an ordinance requiring the company in consideration of operating without a franchise to accept a 3-cent fare. The company adopted the policy of refusing the 3 cents but carrying the passenger free. This lasted from March until September last. The people felt that the company was being forced toward a proposition by the city of a franchise that would give a fair return on actual investment.

Then Judge John M. Killits in federal court granted an injunction restraining the city from enforcing the 3-cent ordinance as a rental for its streets.

There was general public criticism of this action. Judge Killits haled in the business agent of the Central Labor Union, The Toledo *News-Bee* and its editor, N. D. Cochran, and one or two others on charges of contempt of court. He tried the cases himself, found the defendants guilty, roundly rebuked the labor leader, fined the *News-Bee* and its editor $7,700. The only defense made by the defendants was that they had the right to discuss publicly matters of public interest if they did not exceed the bounds of truth and good citizenship.

That was probably the final blow to the company's chances of a franchise. That and the wretched service especially at busy hours explain the popularity of the "jitney" bus and its active support by the people.

The following is still another example of the same kind of newspaper bulletin sent broadcast to the daily papers for publication as original matter.

MOVIE TOWN OUSTS TROLLEY FOR "JITNEYS"

Universal City, the only moving picture municipality in the world, is going to oust the trolley system entirely. The town solons have decided to establish a "jitney" bus line from the entrance to the city, down Lankershim Boulevard and thence east along the Laemmle Boulevard to the eastern suburbs of the town.

The new "jitney" bus line will thus connect the zoo and ranch houses with the city itself, centering around the administration buildings. The advent of the "jitney" bus on the Pacific Coast threatens to oust the trolley system entirely.

Abstracts of Electric Railway Reports

The Public Service Commission for the Second District of New York recently issued Volumes I and II of its report for the year ended Dec. 31, 1913. The first volume contains the cases and orders, but the second is devoted to abstracts of corporation reports for steam railroads, electric railways, express companies and sleeping-car companies. The section for electric railways contains a statement of the organization of such companies as of June 30, 1913, and their mileage. Tables are also presented showing the cost of road and equipment, funded debt, funded debt issued or assumed, capital stock, location and length of road operated, classification of mileage within New York, car equipment, operating revenues, operating expenses, operating statistics, employees with salaries and wages, accidents, and principal officers and offices. Such tables are in the main for both operating and lessor companies. Supplemental sections present data in regard to inchoate and dormant electric railways and also to changes in the corporate organizations of electric railways during the year.

Valuation Conference in Washington

A valuation conference has been called to be held in Washington, beginning March 22. The division of valuation of the Interstate Commerce Commission has virtually completed its appraisals of a number of railroads. In the prosecution of this work many questions have come up which the commission believes can be answered at a hearing in which the carriers, as well as representatives of the state commissions, will have an opportunity to take part. Among the questions to be considered are how depreciation shall be determined, whether by mortality tables or actual observation or by a combination of these two methods; whether obsolescence and inadequacy shall be considered and whether an allowance will be made for appreciation; what overhead charges shall be allowed and how shall the time necessary to reproduce the property be determined.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Manufacturers Association Announces Reduction in Dues—Biographical Sketches of Officers of Manila Section, Completing the Series Are Given—Other Activities Are Reported

POWER DISTRIBUTION COMMITTEE

The sub-committee on materials for 600-volt trolley construction met in the association rooms on Feb. 25 and 26. Those present were A. S. Richey, Worcester, Mass., chairman of the main committee, and C. L. Cadle, Rochester, N. Y.; C. F. Woods, Boston, Mass., and C. R. Harte, New Haven, Conn., of the sub-committee.

After completing work on the "general clauses," "wrought iron and mild steel," "malleable castings" and "wood cross-arms" specifications were carefully considered and put in tentative shape with the understanding that the chairman of the sub-committee, Mr. Harte, will take up certain details with manufacturers. The sub-committee will meet again on April 1.

OFFICERS OF THE MANILA ELECTRIC RAILROAD & LIGHT COMPANY SECTION

At the organization meeting of the section held on Dec. 15, Oscar Keesee, superintendent of transportation, was elected president and Walter E. Smith, purchasing agent, secretary. Brief biographical sketches follow.

Mr. Keesee has occupied his present position since 1910 after a year's experience as assistant superintendent. He was born in Hillsboro, Texas, in 1876 and attended the local public schools and Baylor University until 1895. After occupying sundry positions he enlisted, in 1898, in the Third Texas Volunteer Infantry, holding successively the ranks of private, corporal and sergeant. In 1899 he enlisted in the Thirty-third United States Volunteer Infantry and served successively as private, corporal, first sergeant and sergeant-major, leaving the service in 1901 to enter the Manila Police Department, where he served first as patrolman, then as roundsman, and finally as sergeant. He left this work in 1909 to join the staff of the Manila Electric Railroad & Light Company.



OSCAR KEESEE



WALTER A. SMITH

Mr. Smith has occupied his present position since 1912. He was born in Ponca, Neb., in 1880 and subsequently moved to South Dakota where he attended the public schools. His practical work began in 1896 in railroad construction and after two years of this he spent a year in Ward's Academy. He enlisted in 1899 in the Thirty-fifth United States Volunteers for service in the Philippines and was discharged by special order in 1901 to permit him to become a member of the semi-military police organization of Manila. In 1905 he joined the construction staff of J. G. White & Company, leaving this in 1905 to join the operating company at the beginning of operation of the Manila Electric Railroad & Light Company. In 1906, after a vacation in the United States, he returned to the Islands and entered the service of the Philippine Railway Company remaining with it for two years. After this, until 1912, he was employed with the Insular purchasing agent.

MANUFACTURERS' ASSOCIATION NOTES

The executive committee of the Manufacturers' Association has decided, in view of the fact that there will be no exhibition in connection with the 1915 convention and because of the adverse business conditions, to reduce the annual dues for 1915 from $30 to $10. The initiation fee will remain at $15.

The association will keep up its active work in the interest of its members for, in spite of the omission of the exhibition this year, there are many things which the association does for its members. Plans are under way for the formulation of a campaign of publicity for those of the member companies which will have permanent exhibits at the Panama-Pacific Exposition; and the interests of the non-exhibiting members will not be neglected.

The association is in touch with the bureau of foreign and domestic commerce of the Department of Commerce and also with the Chamber of Commerce of the United States and through these sources is planning to keep its members informed as to foreign trade opportunities.

Transportation arrangements for the 1915 convention are gradually assuming shape. The transportation committee is planning to send at least four special trains to the convention, three of them originating on the Atlantic Coast.

H. G. McConnaughy, director of transportation, has in preparation the train itineraries. The equipment for these trains has already been secured, and the association is assured of the finest specials that will go to San Francisco. It is the intention of the committee to give the delegates every comfort and luxury and to arrange for a trip which will permit of visits to all the important points of interest between Chicago and the coast.

As soon as the details of the trip are worked out the committee will make an announcement to the members. In the meantime, it can be safely assumed that nothing will be omitted to make the visit to San Francisco one of the most interesting and enjoyable events in the long history of the two associations. Mr. McConnaughy is starting for the coast, as this issue of the Electric Railway Journal goes to press, for the purpose of arranging many of the details of the trip in person.

PUBLIC SERVICE SECTION

An extra meeting of Section No. 2 was held in Camden, N. J., on March 11 for the convenience of the employees in the southern part of the State. President P. F. Maguire presided and Secretary A. T. Warner also attended. The fundamental parts of the papers by L. D. H. Gilmour and H. C. Donecker, described in the issues of the Electric Railway Journal for Feb. 20 and Feb. 27, were repeated. While the meetings regularly scheduled for the third Thursday of each month will continue to be held in Newark, at company headquarters, the officers plan to diffuse the benefits thereof throughout the entire system.

COMMUNICATIONS

Maximum Motor Input

NORTH-SOUTH HOLLAND TRAMWAY COMPANY
HAARLEM, HOLLAND, Feb. 8, 1915.

To the Editors:

Referring to the discussion on maximum motor input in your issue of Dec. 19, it will be perhaps of interest to your readers to know that for a direct-current line of 1200 volts which I built in 1910 the following specification was prescribed for the motors:

"After testing the motors with their normal current at one hour rating, they have to be subjected to double this current for five minutes, without flashing or injurious sparking. Furthermore, the motors will be overcharged to a greater extent, to get some information on the sparking at greater overloads."

The motors were of 30 and 80 brake-hp rating for one hour, and were built without any objection by the Siemens-Schuckert Works of Berlin, the Bergmann Electricity Works of Berlin, Brown, Boveri & Company of Baden (Switzerland) and the Electrotechnical Industry of Dikkerveer (Holland). They have stood these tests in every respect.

H. J. MULDER,
Electrical Engineer.

The Company Section Movement

WASHINGTON RAILWAY & ELECTRIC COMPANY
WASHINGTON, D. C., March 6, 1915.

To the Editors:

I have been interested in the editorial discussion in the columns of the ELECTRIC RAILWAY JOURNAL on the company sections of the American Electric Railway Association. The following remarks are based on practical experience in the movement and will, I hope, be suggestive to members of present and prospective sections.

"Company sections" mean another forward impetus to the electric railway industry. We feel it and know it, but can we prove it? Can we set forth facts and arguments in sufficient strength to induce electric railway men in all departments of the industry to join the movement, to become live factors in promoting the reasons for its organization? We must have firm ground to stand on; if we hesitate when we are asked "What benefits do you get from the section?" or "Why should I join the section?" and cannot prove our claims for the movement, then the movement is lost.

The growth of the sections has been rather slow, due no doubt in a great measure to lack of proper tools with which to work. Let us "get busy" and put that vital force into our arguments which will not only get members for our movement but keep them members—and live ones.

We must first be interested and attracted by the meetings of the section; we must have live talks on live railway subjects by live railway men; talks straight from the shoulder. Perhaps the association could arrange an interchange of prominent speakers for meetings of the sections; men who know and whom others would consider it a privilege to hear. Of course, we always have home talent which can discuss local conditions, of interest to those who have their company's welfare at heart.

We must let the members get the benefit of free discussion, making them rely on themselves so they can speak in public both fluently and forcibly.

We must make our meetings attractive in other ways, educationally and socially, by securing good speakers and motion pictures, slides, etc., on subjects of current interest and by utilizing local talent in the line of instrumental and vocal music. We can offer prizes for the best papers on selected subjects, which will encourage employees to express their thoughts.

To conclude, we must first convince ourselves that we are reaping benefits from the company section movement. With that accomplished, the movement will grow rapidly and irresistibly. Let us "start something"; bring forth our arguments in these columns "why we are existing." Let us tell the other railway managers and employees "what they are passing up," and they will become interested, ask for details and finally start new sections.

GEORGE G. WHITNEY,
President, Company Section No. 4.

Filing of Technical Literature

NEW HAVEN, CONN., March 6, 1915.

To the Editors:

I have followed the discussion on the filing of technical data which was carried on in the columns of the ELECTRIC RAILWAY JOURNAL a short time ago. Your readers might be interested in another contribution on the same subject.

Years ago the writer was engaged in construction and operating work and the need for a classification of technical information was not so apparent. In recent years in consulting engineering work, however, the situation would often arise where information covering some specific point was wanted and wanted immediately. Usually what would happen would be that I remembered having some six months or a year before seen the precise information now needed, but for the life of me I could not remember just when or where I had seen it. In other words, it was lost, covered up by the mass of technical information which every engineer is forced to at least run his eye over during the course of a year.

I have always been most closely connected with work relating to the electrification of steam railroads. In order to cover this subject I some time ago arranged to classify all information received, either in the course of daily work, or from the technical press, in such a manner that any item would be quickly available. For this purpose I divided the subject of electrification into nine main divisions and a number of sub-divisions which has gradually grown to about 160. All matter relating to any one sub-division is dropped into a stiff cardboard folder suitably numbered and designated. The main divisions follow the natural divisions of electrification work. For instance, all electrifications must have a source of power. The subject "Power Stations" is then numbered "1" and forms the first main division. In the same way other natural main divisions are "Primary Transmission Systems," "Sub-stations," "Rolling Stock," etc. Anything relating to power stations, therefore, takes the prefix "1"; anything relating to primary transmission systems takes the prefix "2"; rolling stock data takes the prefix "6", etc.

Coming now to the sub-divisions under these main divisions, the main subject "Power Stations" is subdivided into such items as "Capital Costs," "Land and Buildings," "Boiler-room Equipment," "Engine-room Equipment," "Auxiliaries," "Coal Consumption," "Operation and Maintenance," "Cost of Manufacturing Electricity," etc. Each of these sub-divisions has a separate folder and the appropriate prefix "1.1", "1.2", etc. By the use of the decimal system for numbering the folders, the sub-dividing can be carried as far as may be desired.

In order to cover a large number of subjects which cannot properly be classified under any of the natural divisions of electrification, I have formed what is called a "general" main division, which takes the prefix "0," and contains such subjects as circuit breakers, which are used in power stations, in substations, on line construc-

tion and on rolling stock. The same is true of insulation or lightning protection. Data relating to insulation, lightning protection, or to the cost or capacity of circuit breakers are therefore classified by themselves under the general main division. A list both of the main divisions and of sample sub-divisions is given below.

While the arrangement shown is entirely an arbitrary one, adapted merely to the writer's personal interest in the subject of electrification, the same general principle can be applied to any branch of engineering. In fact, one of my friends, a professor at one of the large universities whose general subject is "transportation," has grouped and numbered this subject in the above manner, using more than 1000 sub-divisions.

The danger in any classification system of this kind is that it may become top-heavy or unwieldy, or, after a time will contain much matter that is obsolete. It is necessary therefore constantly to be weeding out and conveying to the scrap basket data which have been replaced by more accurate or up-to-date information or which for any other reason have become obsolete. By so doing one can keep this portion of his engineering tools clean and bright and ready for any emergency. In practice the system outlined above has worked out surprisingly well; requiring very little outlay of time to maintain it in good workable condition. If at any time it becomes necessary to investigate some specific subject, such as "freight-yard electrification" or "train resistance," etc., one's store of information is ready for instant use.

William Arthur, Assistant Engineer,
With McHenry & Murray, Engineers.

[Note. The sample lists referred to by Mr. Arthur are given in part below.—Eds.]

Main Divisions Under Steam Railway Electrification

(0) General; (1) Power Stations; (2) Primary Transmission Systems; (3) Substations; (4) Secondary Distribution; (5) Track Circuits; (6) Rolling Stock; (7) Miscellaneous; (8) Description of Complete Electrification.

Subdivisions Under General Topic "0"

(0.0) Indexes; (0.1) Lightning Protection; (0.2) Section Switches; (0.3) Circuit Breakers; (0.4) Switchboards and Switches; (0.5) Insulation; (0.6) Efficiencies, General; (0.7) Electrolysis; (8) Electro-Magnetic Disturbances; (0.9) Signals and Signaling; (0.10) Mountain Grades; (0.11) Training of Motormen and Others; (0.12) Freight Yard Electrical Operation; (0.13) Constants for Single-Phase Circuits; (0.14) Spare; (0.15) Miscellaneous—General; (0.16) Terminals; (0.17) Capital Costs—General; (0.18) Personal; (0.19) Crossing Right-of-Way with Wires; (0.20) Comparison of Systems; (0.21) Power Distribution Calculations; (0.22) Depreciation and Obsolesence; (0.23) General Progress; (0.24) Photographs; (0.25) Ratings; (0.26) Lighting, and so on.

Subdivisions Under Rolling Stock "6"

(6.1) Capital Costs; (6.2) Traction Mechanics; (6.3) Gears and Gear Ratios; (6.4) Motor Types and Characteristics; (6.5) Speed Time Curves and Data; (6.6) Acceleration and Retardation; (6.7) Energy Consumption; (6.8) Weights; (6.9) Train Resistance; (6.10) Operation and Maintenance; (6.11) Control System Data; (6.12) Brakes and Braking; (6.13) Heating of Trains; (6.14) Spare; (6.15) Single-Phase Rolling Stock Data; (6.16) D.C. Rolling Stock Data; (6.17) Three-Phase Rolling Stock Data; (6.18) Split-Phase Rolling Stock Data; (6.19) Mercury Rectifier Rolling Stock Data; (6.20) Permutator Rolling Stock Data; (6.21) Self-Propelled Rolling Stock Data; (6.22) Steam Locomotives; (6.31) Repair Shed Data; (6.32) Draught and Coupling Gear; (6.33) Mileage Statistics; (6.34) Regeneration; (6.35) Failure Notes; (6.36) Miscellaneous Data; (6.37) Clearances; (6.38) Amount of Rolling Stock; (6.39) Current Collection; (6.40) Brushes and Brush-Holders; (6.41) Forced Ventilation; (6.42) Design of Rolling Stock; (6.43) Spare; (6.50) Descriptions of.

Engineering Considerations in a Proposed Line

Zelienople, Pa., March 6, 1915.

To the Editors:

It is proposed to build a double-track road 150 miles long to connect two cities of 50,000 and 300,000 population respectively and traversing a good agricultural country. I should like to hear from some of your many readers on the following questions: Would you recommend a standard gage and why? Would you use steam, electric or gasoline power and why? What size units would you recommend? Single cars, or motor cars and trailer or electric engine and train? Would you recommend single cars and frequent service or large trains and less frequent service? Would you advise the treatment of ties before placing in track? If so, what treatment?

An Interested Reader.

[Note.—Standard gage should certainly be used whether the motive power is to be steam, gasoline or electricity. Narrow gage is warranted only on lines of very light traffic where the topographical conditions are such that the expense of standard gage would be very much greater than that of narrow gage. In the case under consideration this exceptional condition undoubtedly does not occur. It is impossible from the data submitted by our correspondent to advise him as to the proper motive power to use or the extent of the service. It might not pay even to build the road at all.

The proper plan to follow is first to make a study of the probable traffic on the proposed line. The traffic would vary with the population of the intervening country, the community of interest between this population and the terminal cities and between the terminal cities themselves, the extent and character of competing means of communication, etc. The probable traffic, which could be calculated fairly closely by a study of all of these factors, would determine the best schedule, or headway between trains. If the schedule calls for ten trains or cars each way a day or more, as is presumably the case with a double-track line, the chances are that electricity would be the most desirable motive power. With fewer than ten trains a day and little prospect for much early future growth, some system of independent motive power would naturally be considered. Probably gasoline would be best if the traffic was largely passenger, calling for a frequent service, and steam if it was mostly freight and could be carried in a small number of long trains. Of course, if the road was a part of a large steam railroad system, steam would have the added advantage of introducing no change of motive power at the junction of this road and the rest of the system. Before making a definite decision, however, most engineers would make careful estimates of the initial cost, operating expenses of the different motive powers and probable future of the road, especially if the case was near the border line of a choice of powers.

Tie treatment is recommended, as with exposed track the conditions are favorable to rot. The most common method of treatment is by creosote, using either the open or full-cell process.—Eds.]

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

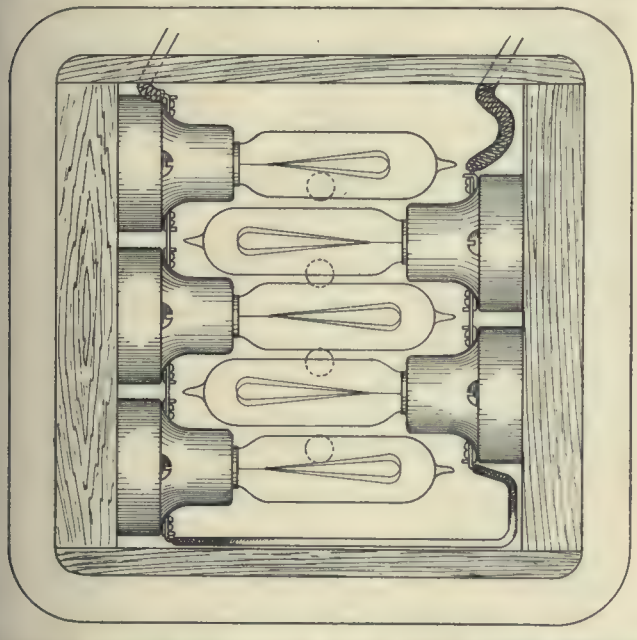
(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Portable Lamp Bank for Equipment Tests

BY F. L. HINMAN, MASTER MECHANIC NEW YORK STATE RAILWAYS—SYRACUSE AND ONEIDA LINES

A very convenient device for quickly locating trouble in connection with electric equipment, such as open circuits, grounds, etc., is a portable lamp bank which is small enough to be contained in the inspector's ordinary tool kit and so constructed that it will not be damaged by rough handling.

A portable bank of this kind, which has given excellent results thus far, has been in use on our lines for some time. It includes a whitewood frame 2 in. deep, measuring 4½ in. x 5¼ in. inside. Two sides of this



SKETCH OF PORTABLE LAMP BANK WITH COVER REMOVED

MATERIALS REQUIRED

2 pieces 11/16-in. x 1⅞-in. x 3⅝-in. whitewood.
2 pieces 5/16 in. x 1⅞-in. x 6-in. whitewood.
2 pieces 3/16-in. x 7-in. x 7-in. agasote.
5 No. 675 candelabra receptacles.
5 8-cp, 130-volt candelabra base lamps.
50 ft. No. 16 flexible S-B. R. C. wire.
10 No. 8 R. H. brass screws.
12 ⅝-in. No. 5 R. H. brass screws.

frame are made of whitewood ¾ in. thick, upon which are mounted five No. 675 candelabra receptacles connected in series and each containing a 130-volt lamp. The mounting of the lamps should be as shown on the sketch in order to occupy as little space as possible.

Two lead wires, one 15 ft. and one 35 ft. long, made of No. 16 flexible wire are attached to the terminals and brought out through a hole in the frame. Two covers 7 in. x 7 in. made of 3/16 in. agasote are screwed on to the frame in such a manner as to provide a groove ½ in. deep and 2 in. wide around the outside in which the leads can be wound.

Four ⅜-in. holes are bored in each cover to provide ventilation and to enable the operator to see the light, although the arc drawn by the bank is sufficient to indicate to the operator the condition existing.

In using this device, if it is desired to test for grounds, the short end may be hooked to the line terminal of the circuit breaker. Grounded armatures, fields or controller cylinders can be quickly located by opening the controller and testing to the proper fingers.

Carhouse of Seattle Municipal Railway

BY H. J. KENNEDY, ELECTRICAL AND MECHANICAL ENGINEER

The carhouse of the Seattle Municipal Railway, although a temporary structure, is substantial of its kind, being of heavy frame construction with concrete foundations and pits. It is sheathed with corrugated iron. An illustration shows the front on Third Avenue West. The building is wide enough to contain three tracks, and a fourth track intended for washing cars and for storage is laid outside. The southernmost track under cover is used for inspection and storage purposes and has a pit at one end which is long enough for inspecting one car, and which is intended for extension when the building is extended. The two northerly tracks are repair tracks. The middle track



SEATTLE MUNICIPAL CARHOUSE—FRONT VIEW OF BUILDING

runs over a deep pit long enough for one car, in which is placed a wheel grinder. The pit under the northerly track is long enough for two cars. Adjoining it on the west is a very shallow pit in which men stand when working on the low maximum-traction trucks which are run out from under the car bodies to this portion of the track.

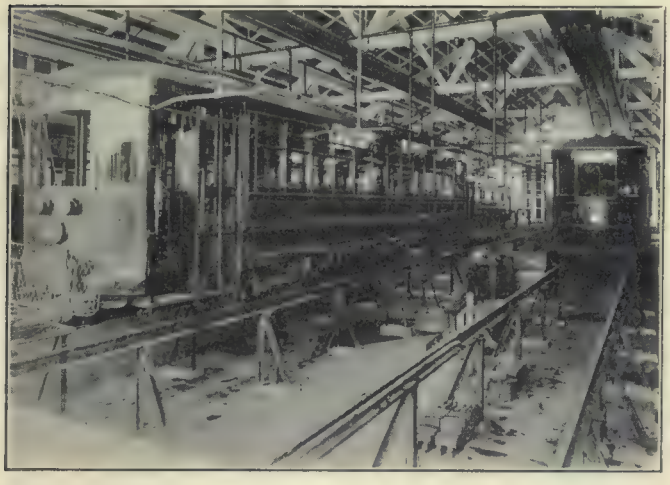
The floor of the deep repair pit, which shows in the foreground of the interior view, is 4 ft. 6 in. below the top of rail. That of the truck pit is 22 in. below top of rail, this being also the level of the floor in the shop building to the north of the carhouse. These floors are made continuous by means of a bench 41 in. wide along the northerly side of the deep pit, the edge of which just shows at the right of the interior view. Steps in the concrete at each end of the pits give access to them. However, a man in the deep pit can readily place a part or tool on the shop floor level, or climb to it himself without going to the steps. The arrangement for a shop restricted by such size limitations as is this one is very convenient.

The rails over pits are 7-in., 80-lb., T-section, and they are supported by cast-iron rail chairs which are placed

at 8-ft. centers and are made of heights to suit the different pits. The chairs are embedded at their bases in the concrete footings, which are laid with a 1:2:4 mixture. The bulk of the repair work is done on the two northerly tracks, which are 16 ft. center to center and allow plenty of room for working on the cars. The roof trusses are heavy enough to support a car body, and four Yale & Towne 4-ton triplex chain blocks have been installed for lifting bodies off the trucks, enabling the latter to be run out to the truck pit.

On the northerly side of the carhouse are located the offices, machine shop, oil house and toilet wing. All these accommodations are on a small scale, as befits the small mileage. However, they are complete enough to include a trainmen's hall, in which are located seats, table and bulletin board for the trainmen, and a safe with chute door for conductor's turn-ins. There is also a main office with provisions for the operating man, station foreman or dispatcher, and a little office for the master mechanic opens off the shop, the latter having a floor 28 in. lower than the office floor. The south side of the shop opens into the carhouse, so that men and materiads, car motors, etc., may readily pass from one to the other.

The oil-house floor is 18 in. below grade, and the tops



SEATTLE MUNICIPAL CARHOUSE—INTERIOR VIEW SHOWING SPRINKLERS AND PITS

of the concrete walls around it are 6 in. above grade. A drain connection with plug is provided in the concrete floor; thus the oil house is itself a concrete tank which can be drained if necessary, and a thorough scrubbing out is facilitated in case of accumulation of oil or grease on the floor. The engine oil used for car lubrication is stored in a Bowser steel oil tank of 120-gal. capacity, with self-measuring pump. Grease is stored in a barrel, and the small quantities of gasoline and kerosene used are at present stored in the cans in which they come. A wagon may be backed up to the oil-room side door and a barrel unloaded onto the track over the tank, rolled either into position over the tank, or to the opposite side of the oil room. Steps from outside give entrance to the end door of the oil room, which has no direct communication with any other room.

The automatic sprinkler system contains 280 sprinklers, of which 120 are in the aisle lines between the car tracks, at a height not over 2 in. below the top of glass in car windows. The remainder are under the roof and in the attached shop and office wings. Separate 6-in. dry-pipe valves are provided for these two branches of the system, being located in a lean-to valve house alongside the carhouse. Air pressure at 35 lb. to 40 lb. per square inch is maintained in the dry pipes by an electrically-driven air compressor having a capacity of 11 cu. ft. per minute. The apparatus is the Globe automatic sprinkler equipment, made by the Sprinkler Company of America.

The lighting system installed in this carhouse is controlled by a semi-inclosed panelboard in the toilet room. One line in conduit is run on each of the seven roof trusses and each has four 100-watt Mazda lamps, located midway between adjacent tracks and between tracks and walls to north and south, respectively. Suitable receptacles are provided for extension cords of desired lengths.

In each pit a conduit is run along the bottom of each rail (being offset to pass around the rail chairs), and at each rail chair are placed alternately 16-cp lamps in wire cages and receptacles for extensions, staggered between the north and south sides of pit, so that at any rail chair a man under a car has a lamp on one side of him and a receptacle on the other. In consequence of the whiteness of the concrete walls and floor, this gives an excellent illumination under the cars, even without using extension cords.

Plans have been prepared for a separate building for the blacksmith shop, which is also intended to house the 3-cu. yd. "Viloco" sand dryer, with bins for coal, green sand, dry sand and smithing coal. The sand dryer, coal and sand bins extend, according to the plans, out under a driveway with trap doors into which wagons can discharge.

A car-wheel grinder of the Q. M. S. type has been purchased for installation in the deep pit in the middle track. The car wheels, while being ground, are turned by their own motor, special rheostats being connected in series with the latter to moderate the speed. For turning the pony wheels of the maximum traction trucks, a series of shafts connected by shifting spur gearing is provided, a removable split sprocket wheel being clamped on the car axle to enable it to be driven. The Department of Utilities in Seattle has been very rigid in enforcing the prohibition of flat wheels in the city, and to meet its desires this extra apparatus was designed. The iron columns of the machine are hollow and are connected by 6-in. pipe underground to an exhaust fan which removes the emery and iron dust from the grinding.

The engineering of location and construction of Division "A" of the Seattle Municipal Railway was under the direction of the Seattle Engineering Department, A. H. Dimock being city engineer. Division "C," however, was constructed by private capital and later taken over by the city, as already explained in the ELECTRIC RAILWAY JOURNAL. The author of this article, as electrical engineer, was in general charge of preparation and execution of specifications and designs, installation, etc., for pole lines, feeder and trolley lines, rolling stock, substation, carhouse and shops, etc. Architectural and drafting assistance on the buildings, and foremen, electricians, etc., were contributed from time to time by the building and lighting departments. The decision to use a double-trolley system was due to the Board of Public Works. When the initial mileage was completed, Division "A" was turned over for operation to the Department of Public Utilities, of which A. L. Valentine is superintendent.

In a recent investigation made by the Department of Health of Chicago, it was found that the heater capacity of some cars was approximately equivalent to that of the passengers when the car was completely loaded. The cars in question had a capacity with all heaters in full operation, of 27,000 B.t.u. per hour, while, when the car was carrying eighty passengers, the total heat given off by them was about 24,000 B.t.u. per hour.

Chart for Use in Transforming Motor Speed Curves for Different Voltages*

BY F. CASTIGLIONI, NEW YORK

It is often necessary to calculate the speeds at which a railway motor will run at one voltage when a speed-current curve for some other voltage is available. If the motor resistance is known this can be done, for any value of current, by means of the formula:

$$\frac{s_2}{s_1} = \frac{E_2 - Ir}{E_1 - Ir},$$

where s_1 is the speed, from the curve corresponding to the voltage E_1 and the current I, and s_2 is the calculated speed corresponding to E_2 and I. This formula simply states that the speed, for any value of current, is proportional to the counter-emf.

This formula can be used in plotting a chart like that

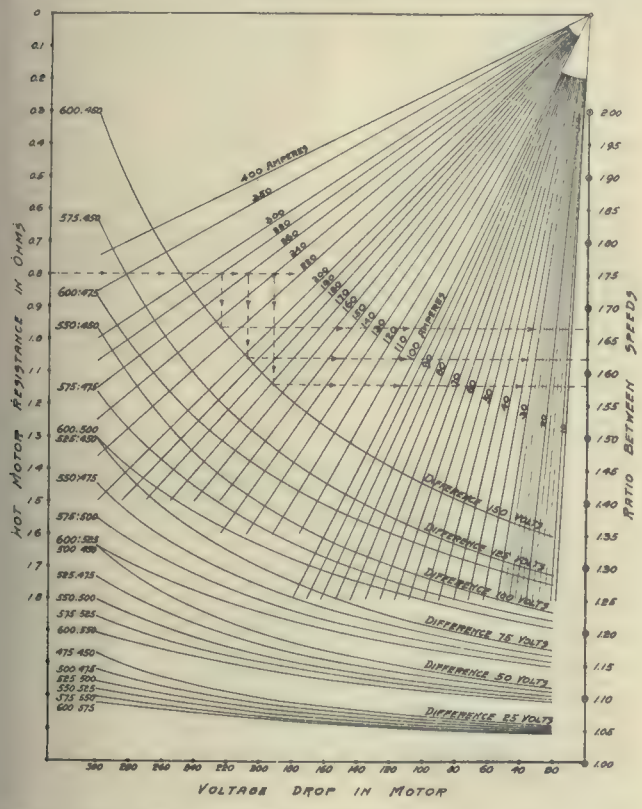


CHART FOR THE TRANSFORMATION OF THE SPEED CURVE OF RAILWAY MOTORS FOR DIFFERENT VOLTAGES

shown, by means of which the transformation can be made very quickly.

The chart consists of two parts: (1) a set of straight lines plotted between hot motor resistance and Ir drop for a large number of current values; (2) a set of curves plotted between Ir drop and the speed ratio s_2/s_1 or $(E_2 - Ir) \div (E_1 - Ir)$, for a variety of voltage ranges liable to be encountered in every-day work. As there is a definite Ir drop corresponding to each value of I and a definite speed ratio corresponding to each set of values of E_1, E_2 and I, the speed ratio can be quickly calculated from the charts as follows:

USE OF THE CHARTS

To determine the speed ratio for, say, a voltage change from 600 to 450 volts at a current value of 280 amp for a motor having a hot resistance of 0.8 ohm, we begin at the 0.8-ohm point on the hot resistance scale at the left and project to the right to the intersection with the 280-amp line. We then project vertically downward to the intersection with the speed-ratio curve and read off the desired speed ratio.

A current-speed curve can be quickly transformed by continuing the horizontal hot-resistance line to intersect a number of the current lines and projecting downward and to the right for each intersection, as indicated by the dot-and-dash lines.

*This chart is reproduced here on a small scale to show the principle involved. For office use the ELECTRIC RAILWAY JOURNAL will supply larger copies to readers, on request and without charge.

Car-Cleaning Practice

The United Railways of St. Louis have built two car-washing plants at different points on the system, one of these holding four cars and the other six cars at one time. In these plants water is squirted from perforated overhead pipes on to the sides of the cars and is supplied to hoses for interior washing, the cars being tilted so that the wash water drains out of one end of the car into a tank on the floor. The wash water is filtered and used over again, being pumped into overhead storage tanks. Rain water from the building roofs is collected and ordinarily is used for make-up purposes.

In Chicago car cleaning at stated intervals has been considered as of less importance than the sweepings at the end of each run, especially on account of the dirt which may be collected during one trip in stormy weather. The same idea has been carried out to its logical conclusion on the Hudson & Manhattan Railroad, where cars are swept four times a day and are cleaned, including the use of whiting and water on the windows, every forty-eight hours. In one of these four daily sweepings the remarkable record of forty-five seconds per car is maintained as a regular routine. This sweeping is one that is made between 6:30 and 7:30 o'clock in the evening to provide clean cars for the theater crowds. At this time, which is included in the evening rush hour, there is not sufficient equipment to permit holding of cars out of service, and the wait at the terminal is only of ninety seconds duration. When a train comes in, a man enters each car and scatters at one end sawdust that is moistened with disinfectant, sweeping it down the length of the car with a 24-in. broom. This broom is wide enough so that two strokes cover the full width of the aisle. The doors at the end of the car where sweeping is begun are opened when the sweeping has progressed to the middle of the car, so that loading of passengers can begin at the earliest possible moment. The whole sweeping operation requires only forty-five seconds, leaving an equal amount of time for the loading of the end of the car at which the sawdust and dirt are swept out. Wiping of seats, stanchions and windows is done at night when the cars are laid up.

An exhaustive investigation into the subject of exterior washing made in Detroit discloses the fact that improper methods may result in annual damage equivalent to thousands of dollars worth of painting on a moderately large city system. The company has, therefore, systematized its whole procedure of washing, making it a standard practice to keep wash water at a temperature below 80 deg. Fahr.; to supply standard stock soda solution to all stations; to have a rinsing follow the soaping without delay and to wet down each car thoroughly before washing to soften mud and sand collected on it. The use of soda ash is prohibited. It is reported that, in consequence, the cars look much cleaner and brighter and no longer have the "dead" look that characterized them in the past.

In Kansas City the Metropolitan Street Railway Company experimented at one of its carhouses from which seven lines were operated to see whether the selling of waste paper collected in the cars could be made profitable. On the seven lines enough discarded newspapers were picked up each month to average about three tons of waste paper, for which the normal market price was

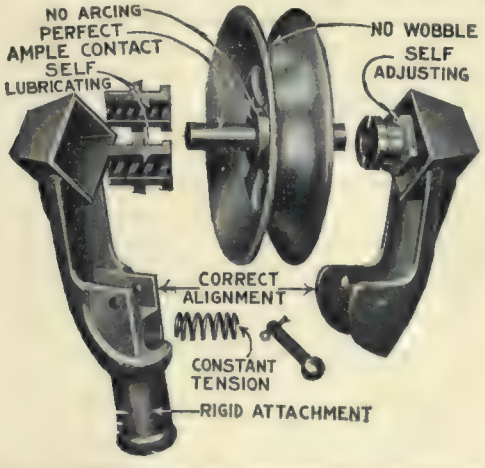
20 cents per 100 lb. For collecting the waste paper each coach cleaner at the carhouse was provided with a burlap sack, and the filled sacks were stored in an old coach, the sale of the paper taking place each month. The car crews also collected waste paper after each trip, storing it temporarily under one of the seats of the cars.

In Detroit the same scheme is carried out, sheet metal receptacles being provided in each carhouse for the storage of the waste paper. In these receptacles are canvas sacks which, when filled, are tied up and taken to the machine shop, where the paper is pressed into 300-lb. bales. The bales are held until a carload has accumulated, at which time the paper is sold, bringing usually about $6 per ton or 30 cents per hundredweight.

Car cleaning at all surface carhouses of the Boston Elevated Railway is conducted according to a regular printed schedule. The semi-convertible cars forming the company's latest standard equipment for surface line operation have their painted work and side glass mopped daily except in foul weather, and daily the vestibule glass is cleaned and mud splashes are removed. The daily work also includes the testing and filling of sandboxes, sweeping of car body, vestibule and steps, removal of heavy dirt by scrapers, and dusting, the last operation being performed not less than two hours after sweeping. The periodical cleaning covers washing of car exteriors after each rainstorm; washing of painted woodwork, dashers and exterior signs every two months; a fortnightly cleaning of monitor glass and a monthly cleaning of headlights. Interior glass is cleaned weekly; curtains, platforms and steps every two weeks, dashers are washed twice a month and painted twice a year, and woodwork and side sills in car body and vestibules and also monitor glass are cleaned monthly.

Trolley Wheel and Harp Run 22,608 Miles Without Lubrication or Adjustment

Several new features have been incorporated in the trolley wheel and harp made by the Traction Appliance Company, Vincennes, Ind. This type of harp, which is known as the "Autograph," includes a well-balanced



HARP RUN 22,608 MILES WITHOUT LUBRICATION OR ADJUSTMENT

bronze trolley wheel into which a steel spindle has been inserted with a drive fit to make it integral with the wheel. The spindle in turn fits into outside bearings that provide for self-lubrication and for automatically taking up or compensating for the wear of either spindle or bearings. These functions are accomplished by making the harp in two sections which hinge together and which are held in position by a single pin fastened with a cotter. A coil spring set in pockets at the base of the two parts of the harp exerts a pressure which tends to force the split bearings against the hub faces of the trolley wheel, thus continuously maintaining correct alignment of the wheel and full electrical contact.

The self-lubricating bearings, which are pressed into sockets in the two parts of the harp, are mounted in pyramid-shaped boxes. These bearings are made of bronze and graphitic inserts, a product of the Graphite Lubricating Company. They are self-lubricating and are said to outwear the wheel. The pressure exerted by the spring at the base of the trolley harp insures a snug fit between the bearings and the spindle and also holds the bearings firmly against the hub, thereby providing automatic adjustment. Because of this method of obtaining widely-separated bearing surfaces and high conductivity, this type of harp is said to increase from 75 per cent to 100 per cent the life of any standard wheel. The maker states that the Vincennes (Ind.) Traction Company in a test made with a 5-in. "Autograph" trolley wheel and harp, from April 21, 1914, to Jan. 2, 1915, obtained 22,608 miles without lubrication or adjustment.

Kansas City Tractor and Trailer Truck

The Metropolitan Street Railway Company, Kansas City, Mo., has cut in two its haulage costs per ton for handling rock and gravel for track construction by means of a motor truck including a trailer body pulled by a tractor. Aside from its reduction in hauling cost this outfit will also deliver as much material in a working day as can be handled by a work train, for the truck can be kept constantly at work while the



TRACTOR AND TRAILER TRUCK OF THE METROPOLITAN STREET RAILWAY, KANSAS CITY, MO.

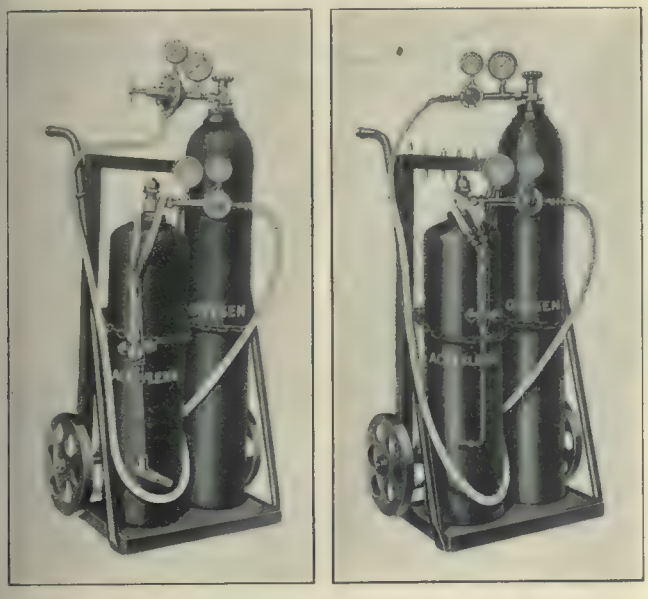
work train would be standing still for loading or unloading. Two interchangeable trailers are employed. They can be attached or detached from the tractor in a minute. Thus the tractor makes a trip while the second trailer is being loaded. The trailers are built with automatic dump-bottoms, and are dumped by means of levers controlled by the driver.

The tractor is made by the Knox Motor Company, Springfield, Mass. The trailer body is manufactured in Kansas City by the Bull Dog Manufacturing Company, and is known as the "Bull Dog" trailer. The two trailers in use by the Metropolitan company are the first which the new company has manufactured.

The Westinghouse Electric & Manufacturing Company advises that the type BR frog, described on page 428 of the ELECTRIC RAILWAY JOURNAL for Feb. 27, is not designed for one degree of angle only as might be inferred from the caption. The frog is designed for several degrees of angle.

Oxy-Acetylene Equipment for Wide Range of Service

Oxy-acetylene welding and cutting equipment asserted to possess some exclusive features has recently been placed on the market by the Imperial Brass Manufacturing Company, Chicago, Ill. One of these features is that of thorough and uniform mixing of the two gases employed; another is the close and accurate regulation of both volume and velocity of the gases delivered to the mixing chamber of the torch to maintain either



OXY-ACETYLENE CUTTING AND WELDING OUTFITS

a constant fixed pressure or a wide range of pressures. The successful solution of these features means the elimination of dangerous back-firing, undue consumption of gases and burning of tips.

Before entering the mixing chamber of the torch, the oxygen, under high velocity, passes through a spiral groove which imparts to it a whirling motion. The whirling motion of the oxygen causes it to mix thoroughly with the acetylene with the result that a uniform mixture is obtained before the gases reach the combustion point. A saving of oxygen is thus obtained and an increased intensity of welding flame and greater efficiency in cutting.

The welding and cutting torches are fitted with interchangeable tips to cover all ranges of work within the limits of the process. The torches are very simple in design and durable in construction, no solder being used in their manufacture. The needle valves permit fine adjustment and are located so that the operator can make any desired adjustment of the flame with the hand that holds the torch, making it unnecessary to lay aside the welding stick.

The welding tips are made of a special alloy with an extremely high melting point, making it peculiarly adaptable for the purpose and insuring long life. All threading and measurements of these tips are standard, so that in an emergency the user can readily make a new tip for temporary use from ordinary brass rod in any machine shop and go on using the torch until a new tip can be secured from stock or the maker.

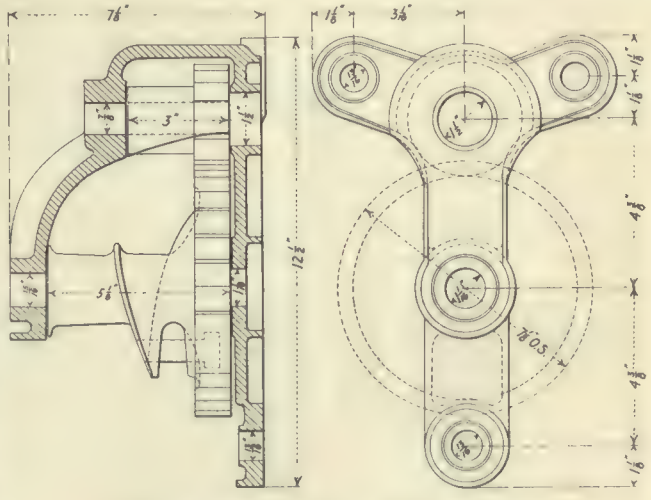
Due to the perfect mixture and accurate regulation of gases obtained with this equipment, the welding flame generated is a long, white, incandescent jet, free from carbons and oxides.

The cutting tips are made of special alloy. Their design is intended to eliminate refractory heat and to prevent the burning out of the tips, as the velocity of the gas passing through the connecting conduits has a tendency to cool the tips. The cutting flame generated by the torch is a very closely confined and accurately proportioned jet of maximum efficiency and makes a clean, quick, narrow cut with the least consumption of gas.

The regulators deliver an absolutely constant, predetermined volume and velocity of gas to the torch, and the movement of the valve with relation to the valve seat, is so limited as to prevent cutting of the seat, thus insuring long life. In cutting operations, under high pressure, the regulators will automatically shut off in an emergency—a safety feature asserted to be exclusive with this maker. The regulators are made in several different types to cover every requirement of service, clean, narrow cut with the least consumption of gas.

A Geared Hand Brake Weighing Only 25 lb.

The great strides that have been made in the development of powerful yet light and durable geared hand brakes are evident in the Type G Peacock brake shown in the accompanying drawing. This brake was brought out as early as 1911 by the National Brake Company, Buffalo, N. Y., for service on the storage-battery cars of the Third Avenue Railway System, New York. Since



LIGHT-WEIGHT GEARED HAND BRAKE

then that railway has equipped 160 storage-battery cars with the same brake and the New York Railways has followed its example. To-day, therefore, more than 200 storage-battery cars in New York alone use the Type G. The Third Avenue Railway has not been obliged to spend a cent for the maintenance of its brakes, although many of them have been under hard usage for three to four years.

While the Type G brake complete weighs only 25 lb., its 14:34 gear ratio enables the motorman to develop a chain tension of more than 900 lb. when he exerts a 50-lb. pull on a 12-in. handle. The braking apparatus is also very compact since the platform space required is only 8⅜ in. x 12½ in. The maker advises that this type of brake is particularly suitable for single-truck or double-truck cars weighing up to 25,000 lb.

The Metropolitan Street Railway Company, Kansas City, Mo., has supplemented its street car "safety first" placards with similar cards for the carhouses. The series now includes five cards, and each day one of these cards is put in a frame under the clock, on which are the words: "See Safety Bulletin To-day."

Center-Entrance Cars for Wilkes-Barre

The Wilkes-Barre (Pa.) Railway has lately received from The J. G. Brill Company six center-entrance steel cars which are to be operated as prepayment cars from the center of Wilkes-Barre out through three or four suburban towns. Each car seats sixty passengers in the customary combination of transverse seats for the greater part of the car and longitudinal seats at the doorways and corners. At the ends, however, the usual semicircular seating is replaced by a double cross-seat backed against the railing behind the motorman's equipment, by a folding seat placed on the motorman's exit door and by a longitudinal seat opposite this door.

The length of this car is 47 ft. 2 in. over the vestibules and 48 ft. 2 in. over the Hedley anti-climbers; the distance between the truck centers is 30 ft.; the width over the sills, 8 ft. 1¾ in.; the height from the sill to the trolley base 8 ft. 7¾ in. and the height from the top of the rails to the sills 11 in. at the center and 2 ft. 8 in. elsewhere. The underframe is built up of channels and angles, the sides include angles and T-posts with 3/32-in. side plate carried to a height of 2 ft. 5 in. outside of center section and roof is also framed in steel.

The body is mounted on two No. 27 MCB-2X trucks with 30-in. wheels. Each truck carries two Westinghouse 532-B motors. HL control is used, together with Ackley hand and Westinghouse semi-automatic air brakes. On account of clearance conditions due to the well, two small reservoirs instead of one large one are used. Effective train operation on short curves, such as occur particularly on the city division, is provided by Tomlinson Form 8 couplers.



WILKES-BARRE CAR—SIDE VIEW, SHOWING PARTIAL GLAZING OF BOTTOM PANELS IN CENTER DOOR; ALSO DOOR FOR USE OF MOTORMAN IN THROWING SWITCHES, ETC.

The entrance step is only 11 in. above the pavement. This is followed by a ramp of 4 in. to the center of the well, a riser of 12 in. from the edge of the well to the main aisle and finally a ramp of 11 in. within a run of approximately 11 ft. to the highest point of the floor line. Division railings are not used at the doors. However, a vertical stanchion is provided in the center with rails and stanchions at the edges of the well to aid passengers to reach the upper level most safely. A compact hand control stand for opening and closing the folding doors has been provided, as shown. The door on the right-hand side is operated from the standard on the same side and vice versa, thus shortening the operating levers.



WILKES-BARRE CAR—VIEW AT CENTER, SHOWING RAMP IN WELL, DOOR CONTROL STANDS AND SUPPORTING RAILS; ALSO THE OPEN VESTIBULE WITH CURTAIN ABOVE AND THE FOLDING SEAT ON MOTORMAN'S DOOR

Small Mazda Lamps with Concentrated Filaments

The distinctive features of the concentrated filament Mazda lamps of high wattages have proved so popular that the Edison Lamp Works of the General Electric Company has developed vacuum Mazda lamps of similar appearance in the 25-watt, 40-watt and 60-watt sizes. This concentrated filament construction gives greater vertical distribution of light than the regular Mazda lamps of corresponding wattages. The new lamps will, therefore, be employed where natural distribution of light downward is required.

These lamps will be made in the same sized bulbs as the corresponding regular Mazda lamps, will have the same spherical watts per candle-power efficiency and will have a rated average life of 600 hours.

Outdoor Substation

The outdoor substation illustrated is one of the new designs of the Transmission Engineering Company, Pittsburgh, Pa., and provides for mounting the transformers on the ground. It was installed for the Virginia Western Power Company at Covington, Va. The installation consists of three 100-kw O.I.S.C. single-phase transformers. The transmission system is operated at 44,000 volts and is about 64 miles long.



OUTDOOR SUBSTATION AT COVINGTON, VA.

The transmission line is dead-ended to the steel tower which carries the Burke horn gap switch, lightning arrester and fuse. A steel pole is used to support one end of the high-voltage bus wires over the transformers.

This construction is well adapted where the transformers are too large to be carried on a platform above the ground.

In a recent interview, Maurice Coster, manager of the foreign department Westinghouse Electric & Manufacturing Company, expressed the opinion that if the British government takes over many factories to make war materials directly, according to powers granted by the House of Commons on March 9, many orders for material of a non-military character are likely to come to this country.

Exhibits at Panama-Pacific Exposition

Electric Railway Apparatus Shown in Both the Palaces of Transportation and of Machinery

Under the plan of classification of exhibits adopted by the directors of the Panama-Pacific Universal Exposition at San Francisco, the exhibits of electric railway interest are divided between the Palace of Transportation and the Palace of Machinery. In the former are the exhibits of cars, locomotives, car seats, track, etc., while in the Palace of Machinery are electric motors, power station equipment, machine tools, etc. Several companies have exhibits in both buildings, and others have entries in both groups of exhibits but are exhibiting in one place only. A list of all of the exhibits by manufacturers of electric railway interest in these two buildings would contain nearly as many names as the official catalogue, but the following have been selected as typical.

RAILWAY GROUP IN PALACE OF TRANSPORTATION

American Brake Shoe & Foundry Company, Mahwah, N. J.; railway equipment.

Baldwin Locomotive Works, Philadelphia, Pa.; railway equipment, trucks.

Brill Company, The J. G., Philadelphia, Pa.; railway equipment.

Galena-Signal Oil Company, Franklin, Pa.; signal oils.

General Electric Company, Schenectady, N. Y.; electric locomotives, car-control equipment, etc.

Griffin Wheel Company, Chicago, Ill.; railway equipment.

Hale & Kilburn Company, Philadelphia, Pa.; car equipment.

National Malleable Casting Company, Cleveland, Ohio; railway equipment, couplers, etc.

New York Air Brake Company, New York, N. Y.; railway equipment, brakes, etc.

Nuttall Company, R. D., Pittsburgh, Pa.; gears, pinions, trolleys.

Pennsylvania Steel Company, Philadelphia, Pa.; railway equipment.

Rail Joint Company, New York, N. Y.; railway equipment.

Railway Motor Car Company, Marion, Ind.; railway equipment.

Safety Car Heating & Lighting Company, New York, N. Y.; car equipment.

Service Recorder Company, Cleveland, Ohio; recording devices.

St. Louis Steel Foundry, St. Louis, Mo.; track work.

St. Louis Car Company, St. Louis, Mo.; electric railway equipment.

Taylor-Wharton Iron & Steel Company, High Bridge, N. J.; track work.

Union Switch & Signal Company, Swissvale, Pa.; railway equipment, signals.

United States Steel Products Company, New York, N. Y.; turntable.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.; railway equipment, electric locomotives, motors and control devices, etc.

PRIME MOVERS AND ACCESSORIES IN PALACE OF MACHINERY

Babcock & Wilcox Company, New York, N. Y.; boilers, superheaters, stokers.

Busch-Sulzer Brothers Diesel Engine Company, St. Louis, Mo.; internal combustion engines.

Gold Car Heating & Lighting Company, New York, N. Y.; thermostats, pressure systems, ventilators.

Harrison Safety Boiler Works, Philadelphia, Pa.; boil-

ers, feed-water heaters, V-notch meters, steam and oil separators.

Hoppes Manufacturing Company, Springfield, Ohio; feed-water heaters, V-notch recorders, steam and oil separators.

Lagonda Manufacturing Company, Springfield, Ohio; boiler fittings, tube cleaners, water strainers, automatic steam stop and chuck valves.

Lunkenheimer Company, Cincinnati, Ohio; boiler mountings and equipment, whistles, oiling devices, injectors.

McIntosh & Seymour Corporation, Auburn, N. Y.; Diesel oil engines; steam engines.

National Tube Company, Pittsburgh, Pa.; tubes, pipes and fittings.

Nelson Valve Company, Philadelphia, Pa.; valves.

Pelton Water Wheel Company, San Francisco, Cal.; water wheels, centrifugal pumps, recorders.

Pratt & Cady Company, Inc., Hartford, Conn.; valves.

Schaeffer & Budenberg Manufacturing Company, Brooklyn, N. Y.; indicating and recording tachometer.

Westinghouse Machine Company, East Pittsburgh, Pa.; steam turbines, condenser and auxiliaries.

Worthington, Henry R., New York, N. Y.; power pumps.

Yarnall-Waring Company, Philadelphia, Pa.; steam valves.

General Group in Palace of Machinery

American Cast Iron Pipe Company, Birmingham, Ala.; pipe.

Chisholm & Moore Manufacturing Company, Cleveland, Ohio; chain hoists, traveling cranes.

Cowan Truck Company, Holyoke, Mass.; trucks for handling heavy stock.

Electrene Company, New York, N. Y.; fire extinguishers.

Falk Company, Milwaukee, Wis.; gears.

International Acheson Graphite Company, Niagara Falls, N. Y.; lubricants.

Joyce-Cridland Company, Dayton, Ohio; lifting jacks.

Lunkenheimer Company, Cincinnati, Ohio; lubricants.

McGraw Publishing Company, Inc., New York, N. Y.; technical periodicals.

Minnesota Manufacturers' Association, St. Paul, Minn.; conveying machinery.

National Brake & Electric Company, Milwaukee, Wis.; air compressors and accessories.

National Tube Company, Pittsburgh, Pa.; pipes and fittings.

Pawling & Harnischfeger Company, Milwaukee, Wis.; excavating machinery and accessories.

Pyrene Manufacturing Company, New York, N. Y.; fire extinguishers.

Robinson & Son Company, Wm. C., Baltimore, Md.; oils and lubricants.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.; electric cranes and hoists.

Standard Oil Company, San Francisco, Cal.; lubricants.

Machine Tools in Palace of Machinery

Bliss & Company, E. W., Brooklyn, N. Y.; metal-working machinery.

Carborundum Company, Niagara Falls, N. Y.; grinding materials.

Cincinnati Electrical Tool Company, Cincinnati, Ohio; electrically driven tools.

Detroit Twist Drill Company, Detroit, Mich.; drills, reamers, etc.

Henderson-Willis Company, St. Louis, Mo.; oxy-acetylene equipment.

Jahnke Welding & Manufacturing Company, San Francisco, Cal.; oxy-acetylene equipment.

McLeod Company, Cincinnati, Ohio.; oxy-acetylene equipment.

Superior Corundum Wheel Company, Waltham, Mass.; grinding and abrasive materials.

U. S. Electrical Tool Company, Cincinnati, Ohio; electric drills and grinders.

U. S. Steel Corporation, Pittsburgh, Pa.; collective exhibit tool steels.

Electrical and Distribution Apparatus in Palace of Machinery

American Bridge Company, New York, N. Y.; steel towers and poles.

American Steel & Wire Company, Chicago, Ill.; electric wire and cables.

D & W Fuse Company, Providence, R. I.; electric fuses.

Economy Fuse & Manufacturing Company, Chicago, Ill.; electric fuses.

General Electric Company, Schenectady, N. Y.; direct current and alternating current generators and motors, meters, switchboards, transformers, lamps, battery trucks, gearing, electric drills.

Gest, G. M., New York, N. Y.; underground electric conduit systems.

Sangamo Electric Company, Springfield, Ill.; measuring instruments, transformers.

Standard Underground Cable Company, Pittsburgh, Pa.; wires and cables, wire braiding machines, etc.

Thomas & Sons Company, R. East Liverpool, Ohio; high and low tension insulators.

United States Steel Corporation, Pittsburgh, Pa.; electric line material.

Western Electric Company, New York, N. Y.; electric generators.

Westinghouse Air Brake Company, Pittsburgh, Pa.; air brakes and compressors.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.; direct and alternating current generators and motors, switchboard instruments, lamps, turbines and accessories, transmission gears, welding display, etc.

Westinghouse Traction Brake Company, Pittsburgh, Pa.; air brakes and compressors.

Field-Control Motor Speeds

In an article in the *Electric Journal*, R. E. Hellmund of the Westinghouse Electric & Manufacturing Company states that in order to accomplish the desired saving in power consumption field-control motors should have a full-field speed below that of the standard non-field-control motors. In general, it will be found that the saving in power consumption will be the larger with a lower speed at full field. But here again it is necessary to compromise to some extent because a very low speed at full field means large increase of flux calling for heavy sections in the motor frame and consequent heavy motor weight. Going too far in this direction would, therefore, mean that the increased motor weight might nullify the gain made by too large a decrease in the speed.

Another important point to be considered in this connection is that the larger the difference between the full field and the short field and their respective speeds, the larger will be the current rush when changing over from full field to short field. Excessive current rushes are not only undesirable because they strain the motor and the electrical equipment in the car, as well as the gears, but also because they would defeat one of the main purposes for using field-control motors, namely, the avoidance of large current peaks. In most cases a difference of about 20 per cent to 35 per cent between the full-field and short-field speeds of a field-control motor at the one-hour rating seems to be the best all-around compromise.

News of Electric Railways

LEGISLATIVE COMMITTEE REPORT

Three Reports Presented by the Committee Appointed to Inquire Into New York Commission

On March 9 three reports in regard to the working of the Public Service Commission for the First District of New York were submitted to the Legislature and Governor Whitman by the legislative committee which had been inquiring into the work of the commission. The majority report, signed by all Republican members, said that "results reasonably to be expected" had not come from the work of the commissioners. A supplemental Republican report says that the commissioners were inefficient, dilatory and neglectful. A Democratic report indorsed their work. A separate communication to the Governor from the majority members of the committee said that the findings of fact in the majority report, if undisputed in effect, constituted neglect of duty on the part of the commissioners. It suggested that the Governor give the members a hearing before taking further action. The supplemental Republican report was signed by Assemblymen Knight and McQuistion and Senator Lawson, who also signed the majority report. Their reason for the supplemental report was summed up by Mr. Knight as follows:

"We worked for three weeks trying to learn whether the commission were deficient. We decided to state our conclusions in our report, notwithstanding the fact that other members of the committee wanted the report to contain only a summary of the testimony so that the Governor could act without any recommendations on our part. In our opinion the resolution authorizing the investigation requires us to draw conclusion from the evidence."

The majority report summary of findings follows:

"In short, your committee finds that the commissioners of the first district have not put in operation the provisions of the public service commission law for the regulation of the public service corporations in a manner to have produced the results reasonably to be expected."

The conclusion of the supplemental report follows:

"From the facts stated in the majority opinion our conclusion is that the Public Service Commissioners of the First District have not been efficient in the administration of the affairs of their offices, have been dilatory in the disposition of complaints, and have neglected their duties, in that they have failed to inforce and put in operation for the benefit of the public, the purposes of the public service commission's law."

The minority report of the Democrats said that the commission was not only overcrowded with work, but that the law contained many "jokers" which favor the corporations regulated by it, and that in spite of these conditions the commission had exhibited "marked efficiency in building the subway system." The Democrats did not see anything serious in the failure, noted by the majority, on the part of the commissioners to give personal attention to many matters coming before the commission. In this connection the Democrats said that "when propositions involving hundreds of millions are in question, the neglect to give personal attention to matters of comparatively small importance is largely excusable."

The report of the majority takes up the general work of the commission and then refers specifically to the work of Commissioner McCall, Commissioners Wood and Cram and Commissioner George V. S. Williams. It concludes:

"As a result of this investigation your committee finds that the complaints of citizens regarding service on transit lines in the city of New York have not received from the Public Service Commission the attention that the circumstances require; that through their failure to enforce their orders, inadequate transit conditions have existed for long periods of time without improvement, viz.: service on the Interborough Rapid Transit and the Brooklyn Rapid Transit lines during the non-rush hours; that they have not changed or improved the system of handling complaints, which system, in our judgment, is inadequate and faulty; that they have not taken sufficient interest in said complaints and in some instances have given little if any support or encouragement to the subordinates of the commission; that as a result of said lack of interest and support the efforts of said subordinates have been in many instances futile and ineffective; that in one important instance, at least, the complainants were led to believe by the commission that their complaints might receive attention, whereas the commission had already determined the case in the negative; that for long periods of time no effective action has been taken to make orders affecting service on transit lines, or to enforce orders already made; that the said commission as a whole was at no time actively operative in enforcing its orders by the three remedies provided by the public service commissions law, resulting in some instances in a condition which the records of the commission characterized as 'violation with impunity' by the corporations. In short, your committee finds that the commissioners of the first district have not put in operation the provisions of the public service commissions law for the regulation of public service corporations in a manner to have produced the results reasonably to be expected."

THE MOON POST-OFFICE BILL

There has been considerable speculation in Washington in regard to the reasons why the annual post-office appropriation bill was killed in the closing hours of the Sixty-third Congress, which adjourned on March 4. In order to avoid a special session for the purpose of providing revenues for the postal service in the next fiscal year the Senate and the House adopted a joint resolution continuing for the coming year the appropriations made for the present fiscal year. One theory advanced in explanation of the unusual action of Congress in continuing by a simple resolution authority to expend about $325,000,000 is that the bill failed because it was apparent that the Senate would not agree to the provisions for a readjustment of railway pay for carrying the mails because these provisions were so drawn as to give the Postmaster-General authority to adjust this compensation in a way that would reduce an expected heavy deficit in postal revenues at the expense of the railroads. Another theory is that the House would not consent to the provisions for a readjustment of the compensation of rural carriers and the absence of a provision to forbid the Postmaster-General from demoting letter carriers to save money. Representative John A. Moon, Tennessee, chairman of the committee on post-offices and post roads, is reported to have said that the resolution to continue the postal appropriations was drawn as a result of a conference of Leader Underwood of the Democrats, Leader Mann of the Republicans, Chairman Fitzgerald of the committee on appropriations, Controller Downey of the treasury department, and financial experts of the treasury. Mr. Moon was quoted in this connection in part as follows:

"This is not to be the end of the matter. When Congress assembles in December the post-office appropriation bill will be introduced practically as it stands in the matters in which reform is demanded. It has cost the government more than $600,000 to secure the information leading up to this legislation, and we are justified in going forward, and we shall go forward."

Ralph Peters, president of the Long Island Railroad and chairman of the committee on railway mail pay representing the railroads of the country, said:

"In standing firmly against the passage of Representative Moon's confiscatory railway mail pay rider in the post-office appropriation bill, the Senate, during the last hours of Congress, performed a notable act of justice. The Moon rider would have made the Postmaster-General sole dictator of what the railroads would be paid for mail transportation. It would have enabled the post-office department, in Representative Moon's own words, 'to force the railroads to carry all your parcel post probably without any additional compensation.' With this obviously unjust measure now out of the way, the new Congress can proceed in a sane and orderly manner to provide the railroads their long-delayed fair payment for carrying the parcel post."

M. L. COOKE ON UTILITIES

Philadelphia Director Criticises Their Policies

Morris L. Cooke, director department of public works, Philadelphia, and acting director of the Utilities Bureau, gave two lectures on public utilities at Harvard University, Cambridge, Mass., on March 4 and 5. He said, in part:

"Among the agencies which force compliance with standard and business practices imposed from the top are the national organizations provided for each type of utility, such as the National Electric Light Association, the Commercial Gas Association, the American Electric Railway Association and others. Practically every worker in these lines who is in good standing with the powers that be is forced to join these organizations, and those who do not enjoy the favor of those at the top are practically barred from membership.

"The National Electric Light Association also works in close harmony with and supports such sexless public opinion forming agencies as the bureau of public service economics, the director of which appeared as a speaker at a public meeting in the City Hall, Philadelphia, devoted to electric light and power, and two weeks later was in Washington, D. C., choosing the 'citizens' who later appeared before a Congressional committee in opposition to the purchase by the government of the street railways in the District of Columbia.

"Last year the American Electric Railway Association gave forth a 'code of principles' which advocated among other things fair returns on capitalization, no matter how extravagantly watered, exclusive State control of the local utilities and the holding company. The same report advocated the creation of a financed bureau of public relations which is to have among its various functions that of 'influencing the sources of public education.' . . . The trend of reaction must have seemed pretty strong to have warranted such a pronunciamento.

"That efforts are already being made to influence the sources of public education is shown by such courses of lectures as those given at the School of Commerce of Northwestern University by William D. Kerr, until recently director of the bureau of public service economics, and more particularly those given under the auspices of the so-called finance forum of the West Side Y. M. C. A. in New York City, where every speaker was the employee of a privately owned and privately operated utility or actively allied, as shown by this schedule. That these lectures were considered wholly 'safe' is shown by the fact that they were all published in pamphlet form and distributed free of charge by a Wall Street investment banking house of high reputation."

Mr. Cooke declared that the public is asked to look upon the deliberations of public service commissions as scientific, while insiders know that the method of State regulation carried on under the most favorable circumstances is a hit-or-miss method. "We have been rushed into this era of State regulation with such rapidity that, humanly speaking, it is impossible for any commission more than to scratch the surface of the field that has been assigned to it." Many public service commission laws have been drafted with a view to giving an unfair advantage to private companies.

"It is a safe statement," Mr. Cooke said, "that a Governor hardly ever appoints a commissioner without at least consulting leading men in corporations to be regulated. Corporations in approving or disapproving candidates use a type of sardonic wisdom which has grown out of their experience." Mr. Cooke declared that he had heard it stated by men in authority that the corporations never objected to the appointment of an honest and able young lawyer if he had little or no practice, because it had been their experience that men so situated could be depended upon not to be too rigorous in decisions against companies. Again, corporations have worked for the appointment of weak-kneed but high-toned advocates of the rights of the people. Another cause operating seriously against regulation is the almost entire absence in practice of accepted theories of valuation. Those who control the utility situation deprecate any effort to establish generally accepted principles of valuation.

Mr. Cooke highly praised Prof. Edward W. Bemis, of whom he said: "He is cordially hated by the big men in the utility industries principally because he is a resourceful and competent witness in rate cases and knows how to meet the experts put forward by the private companies as perhaps can no other man."

STRIKE IN OHIO

The East Liverpool Traction & Light Company, East Liverpool, Ohio, and its striking motormen and conductors reached an agreement on March 9 and operation of the cars was at once resumed. The real question between them was whether the differences that had arisen could, under the contract, be submitted to arbitration, and it was agreed by both sides to leave this to Richard Brooks of Brooks & Thompson, attorneys and representatives of the company. He decided that this and some other questions could properly be submitted to arbitration. The men objected in the first place to the company's placing an extra man on one of the coal trains as motorman and insisted on a regular man. The company refused to make the change, but suggested arbitration. The men claimed that the trouble was not subject to arbitration, and this became the real dispute which finally caused the strike. The company agreed to put a regular man on the front end of the train and the man over whom the dispute arose on the rear end, and this was perfectly satisfactory. C. A. Smith, general manager of the company, said on March 11 that the line was again in regular operation.

PUBLIC SERVICE COMMISSION INQUIRY

The inquiry by the Legislative committee into the work of the Public Service Commission of the Second District of New York was begun at Albany on March 4. Frank H. Mott, secretary to the commission, was the first witness. In no instance had the commission since his incumbency had occasion to push a penalty action against any corporation for failure to obey an order of the commission. The increase in the volume of work of the commission was responsible for the increase in the expenses. Mr. Mott reviewed the work of the commission since he was appointed secretary in June, 1913, and described the manner of conducting hearings. He also presented statistics of complaints, both formal and informal, and the orders issued on these complaints.

At the hearing on March 5 the committee confined itself largely to the case of the commission against the United Traction Company, Albany. Charles R. Barnes, electric railway inspector of the commission, testified that the first complaint against service in Albany was made in 1908. In May, 1912, a resolution authorizing the investigation of the United Traction Company was adopted. After the resolution to inquire into the service had been adopted, James F. Hamilton was appointed general manager of the company and the commission postponed the inquiry to give Mr. Hamilton time in which to put into effect changes which he had in mind. Mr. Barnes had nothing to do with the inquiry regarding the request of citizens for 3-cent fares during the rush hours in Rochester in which the commission refused to grant the request. All matters in regard to service on the electric railways in Buffalo which were formerly referred to Mr. Barnes now went to Devoe P. Hodson, the member of the commission from Buffalo.

Martin S. Decker of the commission was the witness on March 6. The question of the granting of rights to the Canadian-American Power Company was gone into.

At the hearing on March 8 Colonel William Hayward, counsel to the committee, questioned Mr. Decker about the Westchester lighting case. In this particular case rehearings were granted, as the final order of the commission had apparently afforded little relief. Mr. Decker said in general that the delay in some of the cases was not the fault of the commission. He referred to the long process involved in fixing the "reproduction costs" of public service plants for rate-making purposes. There was very little duplication of work by the Public Service Commission for the Second District and the Interstate Commerce Commission. Mr. Decker favored the first district commission having supervision over telephone rates in New York City, but was opposed to giving the first district commission jurisdiction in Long Island and Westchester. The salary of $15,000 a year for each commissioner should not be reduced. A part of the session on March 8 was devoted to the action of the commission in approving the merger of the Syracuse, Lake Shore & Northern Railroad, the Rochester, Syracuse & Eastern Railroad and the Auburn & Northern Electric Railroad as the Empire United Railways.

DETROIT'S PURCHASE AGREEMENT

President Hutchins of Detroit United Says Acceptance of City's Purchase Offer Will Be Urged

Acceptance of the Detroit Street Railway Commission's purchase offer for the lines of the Detroit United Railway within the one-fare zone will be urged upon the stockholders of the company by the board of directors at the special meeting called for March 31, according to a letter which J. C. Hutchins, president of the company, has sent to the commission. The offer of the city is to assume the mortgage bonds of the company amounting to $24,900,000. Mr. Hutchins said in his letter:

"The directors considered this important matter, in realization of the fact that the company's plant account records show an investment on these properties exceeding $35,000,000 and of the further fact that should the principles employed in Cleveland to determine value be applied to the basic figures given you by Prof. E. W. Bemis, these properties have a value of more than $30,000,000. The conditions in Detroit, however, are such respecting the desire of the city to municipalize these properties that the directors are willing to recommend to the stockholders acceptance of your proposal and will do so at the stockholders' meeting, stipulating only that this transaction shall be concluded within reasonable time limits, and, of course, with the understanding that a workable and legal plan for the assumption of the mortgage debt shall be formulated and carried into effect."

After the receipt of the letter the commission announced that the plans for the city acquiring the lines would be hurried so that, if possible, the plan of consummating the transaction could be presented at the meeting of the stockholders. The commission is proceeding on the assumption that the offer will be accepted by the stockholders, and it is desired to get all the legal tangles straightened out in order that the proposition may be submitted to the electors within a reasonably short time after the meeting. The commission stated that on account of questions involved the nature of the proposed agreement between the city and the Detroit United Railway probably would not be divulged until the draft has been completed.

SEATTLE'S OPERATING RIGHTS

The City's Right to Operate a Utility Outside the Corporate Limits Before the Court

Judge J. T. Ronald recently overruled the demurrer interposed by Corporation Counsel James E. Bradford in the case of the State of Washington against the city of Seattle, instituted on complaint of the state bureau of accountancy and inspection and seeking to restrain the city from operating that portion of the Lake Burien Street Railway line known as Division "C" of the municipal system, which lies outside of the city limits. Mr. Bradford argued that the complaint did not constitute facts sufficient for a cause of action. Judge Ronald took the position that it does and the matter will now be tried on its merits. W. V. Tanner, attorney general, appearing for the State and the State board of accountancy and inspection, asks for a permanent injunction restraining the city from operating any portion of the line outside of the city limits, on the grounds that such power has never been delegated the city by the Legislature. More than a year ago, when the Lake Burien line was offered to the city as an unincumbered gift by its promoters, the question of the city's right to operate a railway outside of the city was raised. Mr. Bradford advised the Council that the city had such right and acting upon that opinion the Council accepted the railway and bound itself to operate the line. In overruling the demurrer Judge Ronald held that the operation of the municipally owned system was not necessary to the city's existence and that such a power could be exercised only by virtue of a grant of the Legislature. In conclusion Judge Ronald stated:

"It is most certainly plain that the power of the city of Seattle to tax itself to operate a railway outside of its corporate limits was not expressly granted by the statute, and this being a power not essential to its corporate existence, I am compelled to hold that it is not implied or presumed, and that the power given by the city charter to operate a car line outside the city limits is in conflict with the general law of the State."

MASSACHUSETTS LEGISLATIVE NEWS

The committee on street railways has reported adversely on the bill for the state ownership of street railways. The measure provided that upon the petition of 10 per cent of the legal voters of the State, the question of public ownership should be placed upon the ballot, and upon a referendum in favor of the bill the following Legislature was to prepare a plan for the purchase of the existing lines. The committee on metropolitan affairs has reported in favor of the construction of a station in the Boylston Street subway, Boston, at Arlington Street and has reported adversely in reference to petitions for the construction of a tunnel in Dorchester extending the prospective Dorchester subway. The committee has voted leave to withdraw the petition of Senator Bagley that the Public Service Commission investigate the operation of trains on the Boston Elevated rapid transit lines and of cars in the Boston subways. Other bills acted upon adversely by the committee are one that subway cars be made of metal; that the Washington Street tunnel be extended to Dudley Street and the elevated structure be removed in Boston on that portion of the system, and that the Boston Transit Commission investigate the necessity of further rapid transit tunnels and subways, anticipating the requirements of the next twenty-five years.

TOLEDO MUNICIPAL OWNERSHIP ORDINANCES

The ordinances providing for the issue of $8,000,000 of bonds by the city of Toledo, Ohio, for the purchase of the property of the Toledo Railways & Light Company were brought up in the City Council on the evening of March 8. City Solicitor Thurstin declared that the people had expressed their conviction for municipal ownership and that it was the duty of the members of the Council to carry out their wishes. There are two ordinances, each calling for a bond issue of $4,000,000. One provides for taking over the cars and tracks and the other for taking over the power house and other property of the company. The ordinances were referred to the committee on railways and telegraphs.

PHILADELPHIA MEASURE SIGNED

Mayor Rudolph Blankenburg of Philadelphia has signed the amended Philadelphia transit measure passed by the Councils on March 4 and carrying an appropriation of $6,000,000 for preliminary rapid transit work. The Mayor signed the bill upon the advice of his directors, especially Director Taylor of the Department of City Transit. Director Taylor's recommendation that the bill be approved was based upon the fact that, should a veto be sustained, there would be no hope of the passage of a proper transit ordinance this spring. In that event, the construction of rapid transit lines would be delayed for a year. The Philadelphia *Ledger* said that the action of the Mayor in signing the bill apparently committed the city to the construction of a Broad Street subway without terminal facilities, and with no provision for release of the heavy traffic in the congested business districts, and the construction of 3 miles of elevated structure through farm lands in the Northeast, but that the significant fact was that the passage of the measure did permit the city to begin the necessary preliminary work looking toward the construction of a more complete system in the future.

The Mayor said in part:

"We know that the ordinance is defective, but its defects are not so great that they cannot be remedied when reason shall take the place of folly, when business methods shall have superseded politics and selfish interests, by the passage of future transit ordinances. The ordinance now before me will make it possible for us to take the initial step in this important city-wide improvement, yet will not finally bind us to its improvident features. Such defects can be corrected by popular vote in November next before much harm is done, for the final decision on a comprehensive and sensible plan for city transit rests in the hands of Philadelphia's electors, through the election of a free Mayor and a self-owning Council."

KANSAS CITY INTERURBAN STATION

A committee of the City Council of Kansas City, Mo., on March 1 heard the application of W. E. Halsell and others for a franchise for an interurban station between Fourteenth and Fifteen Streets on Main Street. The company known as the Interurban Terminal Building Company has prepared plans for a six-story building, equipped with elevators, grill room and other conveniences, on a tract 225 ft. x 125 ft. The company is said to have the tentative approval of the site of the board of control of the Metropolitan Street Railway, contingent on the granting of the thirty-year franchise by the city.

The committee of the Council that heard the interurban station project outlined postponed further discussion until March 11. It was pointed out that even if the franchise should be granted and the city should establish an interurban station the interurban railways could not be compelled to use it. While the passenger station would not be used for a baggage terminal, it is thought that if the terminal station proposition is settled soon the railways will come to an agreement on the question of express terminals. Several other sites have been suggested for the interurban passenger station, and in the case of some of them the promoters are willing to do as much as Mr. Halsell and his associates toward erecting the building.

LEGISLATION IN NEW YORK

Among the bills introduced in the Senate recently affecting public utility companies are the following: an act to amend the railroad law in relation to the minimum number of trainmen to be employed in the operation of certain trains; making the operation of trains at grade on certain of the tracks of the New York Central & Hudson River Railroad in the city of New York, a public nuisance, and providing for discontinuing the use by the said company of said tracks at grade and for the regulation and improvement of the railroad terminals that approaches thereto, and of the motive power to be used thereon, and for such purposes to authorize the city of New York to grant real property, rights and privileges to said railroad.

Among the bills introduced recently into the Assembly of interest to public utilities are the following: to compel the interchange of transfers between certain elevated and surface railroads in the city of New York; to amend Section 37 and Chapter IV of the laws of 1891 with reference to the assessment of cost and expense necessary to be incurred for the construction of a rapid transit railroad and for property to be acquired for the construction and operation thereof upon property benefited thereby; making the operation of trains at grade on certain of the tracks of the New York Central & Hudson River Railroad in the city of New York a public nuisance.

TOLEDO BRIDGE ORDINANCE

An ordinance has been introduced in the City Council at Toledo, Ohio, which, if passed, will require the Toledo Railways & Light Company to pay a rental of $35 a day for the use of the tracks on the new Cherry Street Bridge across the Maumee River. Under the same ordinance the interurban roads are required to pay $5 a day for the use of the tracks.

Under a resolution adopted some time ago Director of Public Service Boardman was requested to ascertain the cost of laying the tracks on the bridge with a view to arriving at a basis for fixing the rentals. The length of the tracks on the bridge aggregate 1240 ft. and the cost was $22,500. On Jan. 19, 1915, 1051 city cars and 161 interurban cars passed over the bridge. In his letter to the Council Director Boardman said he believed that the cost of the bridge should also be taken into consideration in fixing the rentals, as the company would have been compelled to build a bridge if the city had not done so. He recommended a charge of $24.36 a day, but this was raised tc the higher figure when it went to the Council. The ordinance is to go into effect on Oct. 28, 1915, and the rentals are to be collected monthly. If the local company or any interurban company fails to pay the rentals, the city through its police department is to prevent such company from using the bridge.

PENNSYLVANIA ELECTRIFICATION PROGRESS

According to the annual report of the Pennsylvania Railroad for 1914, the electrification of the main line from Broad Street station, Philadelphia, to Paoli is progressing rapidly and without causing any serious interruption of traffic. The work from Paoli to West Philadelphia is almost completed, including the substations, and the remaining section of the electrification into the Broad Street station is being actively prosecuted. Satisfactory progress has also been made in equipping steel cars now in steam service with electric motors and apparatus in accordance with the original design. It is expected, therefore, to operate the main line suburban passenger trains by electricity about June 1, 1915.

The report states that it is hoped that in 1915 financial conditions will permit the extension of electrification to North Philadelphia and the Chestnut Hill branch, and also the elimination of certain grade crossings on that line. This would relieve the track and yard congestion at the Broad Street station, by transferring to the electric service more than sixty trains on a daily schedule now operated by steam. Further consideration was given during the year to plans for the future electrification of the main line crossing the Allegheny Mountains, from Altoona, the foot of the eastern slope, to Conemaugh, on the western slope, by which it is believed large operating economies can be effected and the heavy freight train movement facilitated.

INDIANA LEGISLATURE ADJOURNS

The Indiana Legislature adjourned on March 8 at midnight. The House on March 3 failed to support Governor Ralston's recommendation that the Public Service Commission be given the right to increase railroad and interurban passenger rates to 2½ cents per mile upon petition and examination of the facts, by killing the Waltz bill which was introduced at the Governor's suggestion. The Senate also killed the Zearing bill, which provided for the control of "jitney" buses by the Public Service Commission. Another measure of interest to the public utilities of the State was Senate bill 316, which extended the time for taking indeterminate permits in lieu of existing franchises from July 1, 1915 (as provided in the public utility commission law enacted May 1, 1913) to July 1, 1917. This was killed by vote in the House on March 6, but on a motion to reconsider introduced on the last day, March 8, was passed by a vote of eighty to four.

The Senate passed the following bills: House bill 110 providing a penalty for the destruction or interference with railroad signals; House bill 492, providing that court service can be made on agent of receiver of a corporation when receiver is non-resident of State; House bill 419, providing a penalty for public service corporations charging rates in excess of published tariffs; House bill 176, which is the compromise workmen's compensation bill as amended in the Senate. A bill was introduced in the Senate on March 3 providing that receivers of insolvent companies may sue stockholders after the funds of the company have been exhausted to pay debts, to secure additional funds to pay indebtedness.

The House killed the following bills: Requiring railroad companies to cut weeds along the right-of-way; bill providing maximum interurban fare of 1½ cents; bill providing that where railroad intersections occur in persons' land they shall have right to construct roadway across right-of-way; bill providing that traction companies shall maintain two toilet rooms in each car; Senate bill providing that newspapers may exchange advertising for railroad transportation.

The House passed the following bills: Senate bill 98, prohibiting public utilities from diverting funds when an order for examination has been made by the Public Service Commission; House bill 171, amending public utility commission act by giving the commission sixty instead of thirty days to take action on railroad tariffs; Senate bill 239, giving Public Service Commission power to order separation of grade crossings in cities of 20,000 population or less; Senate bill 318, amending public utility act to permit railroad companies to give passes to employees who may hold public office.

LEGISLATION IN OHIO

Senator Myers has introduced in the Ohio Legislature a bill which provides that officers of steam and electric railways may build and operate union passenger stations for the use of railroads and interurban railways. Present laws do not provide for this contingency. The Senate has passed the Myers bill which provides that service on receivers of interurban railways shall be valid when made in any county through which the road passes. The House has passed the bill which authorizes the Public Utilities Commission to order high-tension wires placed underground.

The Ott bill has been recommended for passage by the labor committee of the Ohio House. This bill, now somewhat modified in its form, provides for nine hours of work in a limit of eleven consecutive hours and twelve hours of continuous rest for motormen and conductors.

The Smith bill, requiring heat in the vestibules of street and interurban cars for the motormen and conductors, and screens to protect them from dust, has passed both houses and is before the Governor.

Representative Frank Reighard has presented a bill that will do away with the mandatory requirement that the Public Utilities Commission value the property of all public service companies and make such appraisements optional with the commission. The section of the old law will be repealed which requires the commission to make an appraisal on demand of the Council of a municipality where a dispute or disagreement on rates exists. If this bill becomes a law it may affect the proposed valuation of the property of the Cincinnati Traction Company, the franchise of which calls for a revision of fares in 1916.

War Suspends Service.—The Laredo Electric & Railway Company, operating in Laredo, Tex., and Nuevo Laredo, Mexico, is reported to have abandoned service on its line in the Mexican city because of lack of patronage and generally unsettled conditions.

Increase in Return Allowed.—The commissioners of Franklin County have so modified the franchise of the East Linden (Ohio) Electric Railway that it may receive a return of 8 per cent on its investment, instead of 6 per cent, before it is called upon to reduce its rate of fare from 5 cents to six tickets for 25 cents.

Mayor Mitchel on Municipal Ownership.—In an address before the Republican Club in Manhattan, on March 6, Mayor Mitchel of New York, in discussing the question of the new State constitution, said: "I hope to see the new constitution give to cities the right to determine for themselves how far they should go in the direction of acquisition of public utilities."

Oak Park Elevated Suit.—The bondholders of the Chicago & Oak Park Elevated Railroad, Chicago, Ill., have filed a bill in equity in the United States District Court declaring that although the road may have forfeited its rights to the use of the Market Street "stub" structure by accepting various city ordinances, the bondholders have not waived any of their rights, and therefore ask that the city's suit for condemnation be dismissed.

The New Jersey Gas Case.—Argument in the rehearing on the 90-cent gas rate was concluded on March 4 in the Court of Errors and Appeals at Trenton. In the absence of Richard V. Lindabury, counsel for the Public Service Corporation, Thomas H. McCarter, president of the corporation, made the principal argument. Chancellor Walker announced that the case would be taken under advisement in conference. The case involves the question of franchise value and has been referred to previously at length in the ELECTRIC RAILWAY JOURNAL.

Pittsburgh Transit Measure.—Representative A. C. Stein of Allegheny has introduced in the House at Harrisburg, Pa., two bills which are a part of the legislative program of Mayor Joseph G. Armstrong of Pittsburgh. One measure authorizes cities of the second class, Pittsburgh and Scranton, to construct subways for traction lines and pipe galleries and lease them to public corporations. The other authorizes all municipalities to purchase the entire capital stock of bridge companies owning structures wholly or partly within the limits of such muncipalities.

The Seattle Vote.—With the defeat at the polls on March 2 of propositions "A" and "B" providing respectively for the extension of the municipal railway into Ballard and the connection of Division "A" and "C" by motor buses, the municipal railway problem is placed squarely up to the City Council again. Proposition "A" was: "Shall the city purchase and operate auto-cars to connect Divisions 'A' and 'C' of the Seattle Municipal Railways, and incur an expense of not to exceed $50,000 for such purpose?" The result was 16,799 for, 20,923 against. Proposition "B" was: "Shall the city extend Division 'A' of the city car lines on Leary Avenue and other streets and incur an expense not exceeding $100,000?" The result was 18,388 for, 19,015 against.

Service Order in Winnipeg.—The Manitoba Public Utilities Commission has issued six orders affecting the Winnipeg Electric Railway; the first provides for the purchase of fire hose bridges to be carried by the fire apparatus so as to be available for use by the street cars at all times. The second provides for the regulation of employees' watches. The third provides for the inspection and control of waiting rooms and shelters. The fourth provides for destination signs on the front and sides of cars. The fifth requires that cars going to the carhouses shall be indicated. The sixth order relaxes the previous order relating to the measure of protection to be afforded at the St. James Street subway by directing the installation of the General Railway Signal Company's light signal. The company has asked that the commission reconsider the fourth order.

Decision Against Duplication of Plants.—The Supreme Court of California has sustained the right of the California Railroad Commission to refuse the Oro Electric Corporation a permit to do business in Stockton, in competition with the Western States Gas & Electric Company. This decision upholds the authority of the Railroad Commission to prevent destructive competition in the public utility business. The Railroad Commission authorized an interview concerning the decision in which it said: "It means that the policies of the Railroad Commission, based on a State-wide view, cannot be thwarted by purely local considerations, and that henceforth the commission will not necessarily be bound to permit the impairment of an existing public utility service, if it is just and reasonable, by admitting a new public utility into the field unless the interests of the public clearly so require."

Alien Law Legislation.—Under an emergency message from Governor Whitman of New York the Senate on March 8 passed the Spring bill repealing the alien clause in the labor law. Before it was placed on final passage, however, the bill was amended so radically that in its final form it provided for amendment rather than repeal of that clause. The Spring bill as modified would provide that preference should be given to citizen labor over alien, whenever citizen labor can be obtained on public contracts. In its original form the bill merely repealed the alien clause in the labor law and left contractors on public works a free hand to employ any sort of labor they desired. On the same day the Supreme Court of the United States made it plain that its injunction of March 4 meant that the Public Service Commission of New York could not interfere with the employment of aliens by the subway contractors and that the contractors even if they employed foreign labor must be paid. The Chief Justice said: "The purpose of this order is to continue in force the injunction provided for in the judgment of the Appelate Division of the Supreme Court of the State of New York and to continue the same in full force until the final decision of this court in this case, or until the same is modified by order of this court." A move was made at Washington on March 8 for the advancement of the hearing in this case. It is expected that a date in April will be fixed by the court.

National Electric Prosperity Week.—At a meeting of the Society of Electrical Development, Inc., held on March 4 in New York, definite action was taken in connection with the selection of a committee to have charge of the movement which has been inaugurated for the so-called National Electric Prosperity Week. The chairman, E. W. Lord, and the general manager of the society, J. M. Wakeman, were decided upon to select a nominating committee of five men representing the varied interests who in turn are to select twenty-five men who will represent the central stations, manufacturers, jobbers, contractors, dealers and the technical press. One man from each interest will

be named as chairman of his division. Messrs. Lord and Wakeman then named as a nominating committee John Williams of the Cities Service Company, representing the central stations; Ray D. Lillibridge of the Wagner Electric Company, representing the manufacturers; E. W. Rockafeller of the Western Electric Company, representing the jobbers; J. R. Strong of the Tucker Electric Construction Company, representing the contractors, and Hugh M. Wilson of the *Electrical World*, representing the trade press. This committee will meet to select the steering committee, which will be composed of men prominent in the electrical industry, representing the General Electric, Westinghouse and other large manufacturers, also the leading central stations, jobbers, contractors and dealers of the country.

PROGRAMS OF ASSOCIATION MEETINGS

Pennsylvania Street Railway Association

At a meeting of the executive committee of the Pennsylvania Street Railway Association held on March 5 it was decided to hold the spring meeting of the association at Pittsburgh on May 11 and 12. P. N. Jones, general manager of the Pittsburgh Railways, and T. B. Donnelly, claim agent of the West Penn Traction Company, were appointed a committee on arrangements. A committee on the program will be announced later.

Illinois Electric Railway Association

The next meeting of the Illinois Electric Railways Association will be held on March 19, at the Hotel Morrison, Chicago, Ill. It is announced that papers will be read by J. M. Bosenbury, superintendent of motive power and equipment of the Illinois Traction System, Peoria, Ill., and by Robert M. Feustel, formerly chief engineer of the Illinois Public Utilities Commission. A list of questions regarding operating problems brought up by some of the member companies has been sent out with the announcements of the meeting, which stated that they will be brought up for discussion.

Western Society of Engineers

At a meeting of the Western Society of Engineers to be held in Chicago on the evening of March 16, 1915, during the week of the convention of the American Railway Engineering Association, the results secured with electrified steam roads will be discussed. W. S. Murray, consulting engineer of the New York, New Haven & Hartford Railroad, will describe the results secured on that road between New Haven and New York, a distance of 74 miles. Edwin B. Katte, chief engineer of electric traction of the New York Central Railroad, New York, will discuss the results secured from electric operation on his road, illustrating portions of his address with lantern slides. R. Beeuwkes, electrical engineer of the Chicago, Milwaukee & St. Paul Railroad, Butte, Mont., will read a paper describing his 440-mile electrification, construction of which is now under way. Several other engineers in charge of similar projects have been invited to take part in the discussion.

Iowa Street & Interurban Railway Association

The fifteenth annual convention of the Iowa section of the National Electric Light Association will be held in Keokuk, Ia., on April 20, 21 and 22. The annual convention of the Iowa Street & Interurban Railway Association will be held in the same city on April 22 and 23. The Iowa Electrical Contractors' Association will also hold its annual meeting at Keokuk some time during this period. The members of the associations will be the guests of the Keokuk Electric Company and the Mississippi Power Company, Stone & Webster properties, and the entertainment will include a banquet given by the manufacturers and their representatives, followed by an illustrated lecture on the development of the Keokuk Water Power. It is intended to charter one of the large Mississippi River steamboats on the last afternoon of the convention for the purpose of a ride up the Mississippi River. Sessions will be held on the boat in the afternoon, and dinner will be served en route. The return to Keokuk will be made at about 11 p.m. It is not intended to hold a regular electrical show, but space will be provided for any salesmen or manufacturers who wish to display their appliances during the convention.

Financial and Corporate

THE INVESTMENT MARKET

From interviews with prominent banking firms in New York City during the last week it has been ascertained that the general condition of the investment market since Jan. 1 has been more favorable than before, although the market during the last two weeks has been a trifle slower on account of depressing international complications.

There seems to be a ready market for good municipal bonds and a strong demand for railroad and public utility note issues. Since the beginning of the year the electric railway notes sold either in full or in most part, have included the following: Winnipeg Electric Railway, 6 per cent one and two-year notes, $1,500,000; Pacific Gas & Electric Company 5 per cent one-year gold notes, $4,000,000, and United Light & Railways Company 6 per cent three-year notes, $1,500,000. Other short term issues now being placed are Puget Sound Traction, Light & Power Company 6 per cent five-year bonds, $557,000; Massachusetts Electric Companies 5 per cent three-year gold coupon notes, $3,000,000, and United Gas & Electric Corporation 6 per cent three-year collateral notes, $5,500,000. A particular late offering of interest is the $7,000,000 of 6 per cent two-year gold notes of the Montreal Tramways & Power Company, Ltd. Advices are that most of these have been sold to new holders.

The electric railway bond market has not been as active as the note market during the last two months, but some issues have appeared, such as the Massachusetts Northeastern Street Railway 5 per cent twenty-year bonds, $707,000; the Middle West Utilities Company 6 per cent ten-year bonds, $500,000; the Pacific Power & Light Company 5 per cent twenty-year bonds, $1,052,000, and the New York State Railways 4½ per cent fifty-year bonds, $3,000,000. The complete sale of the last two issues indicates a strengthening market for the longer issues. This fact is emphasized by the recent placing of $27,000,000 of New York State canal and highway bonds at a higher premium than expected.

These facts tend to indicate an abundant supply of capital awaiting investment, and it is hoped that the trend toward the absorption of new and attractive offerings is only started. The most striking point in connection with the utility sales thus far, however, is that most of them are for refunding purposes. As yet there is a practically complete absence of financing for new undertakings.

WATER VERSUS RAIL TRANSPORTATION

The March trade letter of the National Bank of Commerce, Detroit, Mich., sets forth a striking statement of the attitude of the national and state governments in relation to the steam and electric railroad industries as compared to other transportation industries. This bank states that it is sometimes difficult for an observer to understand why the United States and state legislatures bestow favors upon transportation by water through granting liberal appropriations, while at the same time they are busy enacting laws arbitrarily to regulate and tax transportation by land.

New ship channels are opened, old channels and harbors are deepened, additional lighthouses and range lights are established and maintained at the government's expense, and United States engineers are stationed at the leading ports to study and recommend necessary improvements to be made at the expense of the federal government. Instead of making similar appropriations of funds, however, to reduce grades, straighten curves and tunnel mountains or to maintain block signals, the government and the state legislatures reduce passenger fares, increase taxation, enact full-crew laws and through commissions compel improvements to be made at the expense of the railroads.

Furthermore, the national government has created the Interstate Commerce Commission, representing the shipper, to fix rates for the shippers and to see that the railroads, if they earn any money at all, earn no exorbitant amount. This is in great contrast to the practice followed for water-borne commerce, the rates for which are fixed by the companies themselves and are regulated only by competition. This general condition of affairs has caused railroad credit to drop to a low ebb, and the bank wonders whether or not the railroads are receiving a square deal.

ANNUAL REPORTS

Twin City Rapid Transit Company

The comparative statement of income, profit and loss of the Twin City Rapid Transit Company, Minneapolis, Minn., for the years ended Dec. 31, 1913 and 1914, follows:

	1914	1913
Revenues:		
Revenue from transportation	$9,227,602	$8,818,178
Revenue from operations other than transportation	72,043	52,158
Total revenues	$9,299,645	$8,870,336
Expenses:		
Maintenance of way and structures	$419,836	$394,527
Maintenance of equipment	389,660	347,453
Traffic expenses	46,579	40,913
Conducting transportation	3,170,957	2,923,629
General and miscellaneous	811,079	794,119
Total operating expenses	$4,838,111	$4,500,641
Net operating revenue	$4,461,534	$4,369,695
Taxes	$593,078	$586,129
Depreciation	994,072	1,060,000
Total taxes and depreciation	$1,587,150	$1,646,129
Surplus available for fixed charges and dividends	$2,874,384	$2,723,566
Fixed charges	$986,743	$975,311
Preferred stock dividends	210,000	210,000
Common stock dividends	1,250,514	1,206,000
Total fixed charges and dividends	$2,447,257	$2,391,311
Net income to surplus account	$427,127	$332,255

By comparison with 1913, the following increases during 1914 were shown: gross revenue, $429,309, or 4.84 per cent; operating expenses, $337,469, or 7.5 per cent, and net operating revenue, $91,839, or 2.10 per cent. The total single-track mileage of the company is 436.72, and the average total single-track mileage operated during 1914 was 418.78. The gross passenger revenue was $9,194,169, and the gross passenger revenue per single-track mile operated was $21,955.

During 1914 the company carried 184,352,963 revenue passengers, as compared to 175,895,811 in 1913, and in 1914 the transfers redeemed numbered 66,742,000, as compared to 63,914,277 in 1913. Other statistics for the two years follow: operating percentage (taxes included), 1914, 58.4, and 1913, 57.35; operating percentage (taxes and depreciation included), 1914, 69.09, and 1913, 69.3; percentage earned and paid on preferred stock, 1914 and 1913, 7; percentage earned on common stock (after depreciation charge) 1914, 8.05, and 1913, 7.65; percentage paid on common stock, 1914 and 1913, 6.

The amount expended for new construction during the year was $1,730,405, and for renewals, $633,733, or a total of $2,364,138. New track and extensions totaling 24.34 miles were built and put in operation during the year. Furthermore, ten old cars were retired from service and seventy-nine were put in service.

Louisville (Ky.) Railway

A summary of the annual report of the Louisville (Ky.) Railway for the calendar year 1914 follows:

Transportation revenue (city lines)	$3,031,452
Transportation revenue (interurban lines)	555,887
Revenue from mail, trackage, advertising and power (city lines)	135,030
Revenue from mail, trackage, advertising and power (interurban lines)	16,390
Gross revenues	$3,738,759
Operating expenses (city lines)	$1,796,664
Operating expenses (interurban lines)	359,514
State, county and city tax for twelve months (city lines)	269,558
State, county and city tax for twelve months (interurban lines)	31,898
Interest on debt, paid and accrued	606,667
Dividend on preferred stock	125,000
Total operating expense, fixed charges and preferred dividend	$3,189,301
Net income applicable to common dividends	$549,458

The revenues for the fiscal year were somewhat below those of 1913 on account of the general depressed business conditions. In spite of this fact, however, the usual common dividend of $545,650 was disbursed from the net income of $549,458, and $3,808 was carried forward. On account of the extensive improvements undertaken during 1913 the company thought it inexpedient to do much along this line during the last year. With the exception of the new shops, therefore, improvements were limited. The whole physical property of the interurban lines was gone over and placed in better condition for future development. Cables and conduits were built and improved during the year, and considerable street and sewer construction work carried on by the city called for outlay by the company for track work. Much of the machinery in the new power house at Twentieth and High Streets was paid for in 1914, this not having been tested and accepted in the preceding year.

Federal Light & Traction Company

The consolidated comparative statement of income, profit and loss of the Federal Light & Traction Company, New York, N. Y., and its subsidiaries for the years ended Dec. 31, 1913 and 1914, follows:

	1914	1913
Gross earnings	$2,416,960	$2,372,174
Operating expenses and taxes	1,498,684	1,443,234
Net earnings (subsidiary companies)	$918,276	$928,940
Federal Light & Traction Company	29,623	36,640
Total income	$888,653	$892,300
Interest charges	586,155	531,787
Central Arkansas Railway & Light Corporation dividend	84,000	63,000
Federal Light & Traction Company dividend	112,500	150,000
Net income	$105,998	$147,513

Depreciation charges and inter-company earnings, expenses and interest charges are not included in the foregoing statement. During 1914 the gross earnings of the subsidiary companies increased $44,786, or 1.9 per cent, but the operating expenses and taxes decreased $55,450, or 3.8 per cent. The net earnings of subsidiary companies therefore decreased $10,664, or 1.1 per cent. The earnings of the holding company, however, increased $7,017, so that the total income decrease was only $3,647, or 0.4 per cent. Interest charges increased $54,368 and the Central Arkansas Railway & Light Corporation dividend $21,000, while the Federal Light & Traction Company dividend decreased $37,500. Hence the net income decreased $41,515, or 28.1 per cent.

Albany Southern Railroad

The gross operating revenues of the railway and lighting departments of the Albany (N. Y.) Southern Railroad for the fiscal year ended June 30, 1914, were $507,048, or 1.97 per cent. The operating expenses, including taxes, amounted to $381,972, an increase of 13.9 per cent, leaving a net operating revenue of $125,076, a decrease of 22.8 per cent. Retirements and replacements and other adjustments chargeable to fixed capital during the year amounted to $13,069, and the surplus was adjusted accordingly.

During the year the railway department of the company suffered diminishing traffic and increased public demands. When the company attempted to meet the decrease in traffic by cutting down a number of trains, complaint was made to the Public Service Commission and the company was obliged to replace the trains taken off. The company on March 27 put into effect an increase in rates, which was also taken before the Public Service Commission. The officers of the company believe that they can maintain the increase as just and equitable. The last winter was one of unusual severity on account of snow and floods. For maintenance the company spent $55,864, or 11 per cent of the gross operating revenue. The increase of $53,853 in operating expenses was caused by the increase of $16,142 in the cost of conducting transportation, and an increase of $13,149 in general and miscellaneous expenses on account of larger accruals for accidents and damages. In construction and new work in this department the company expended $71,856 during the year. This amount represented one new fifty-ton locomotive, two new steel passenger cars, five new passenger car equipments, paving, new track work and other miscellaneous improvements.

The report emphasizes the fact that the officers are bending every effort to secure equitable tax assessments on the property of the company. Last year the taxes amounted to $44,400, or 8.7 per cent of the gross operating revenue.

Slight reductions in the assessments recently filed indicate that the company is beginning to receive some recognition of the unfairness of the assessments. The actual taxes assessed against the property and paid in the last fiscal year represent an increase of more than 100 per cent within seven years.

EARNINGS OF WASHINGTON COMPANIES

The fourth annual report of the Public Service Commission of Washington, covering the period from Sept. 1, 1913, to Nov. 30, 1914, is mostly devoted to reports of cases decided by the commission and reprints of orders issued by it. During the year the commission disposed of 466 formal complaints and issued 411 formal orders, as compared to 428 and 393 in the preceding period. This is the first report of the commission to contain any financial statements for electric railways in the State. No comparative figures for the preceding year are available to indicate the business condition in the Northwest, but the operating results for the year ended June 30, 1914, are shown by the accompanying table.

TABLE SHOWING MILEAGE AND FINANCIAL FIGURES FOR ELECTRIC RAILWAYS IN WASHINGTON FOR YEAR ENDED JUNE 30, 1914

Name of Company	Total Mileage Operated	Total Operating Revenue	Total Operating Expense	Net Operating Revenue	Total Taxes Paid	Total Number of Passengers Carried	Average Fare per Revenue Passenger
Grays Harbor Railway & Light Company	11.94	$124,300	$76,473	$47,827	$8,280	2,526,469	04.713
Loyal Railway	1.75		7,739	475			
Olympia Light & Power Company	6.03	37,190	30,713	6,476	5,100	780,034	04.806
†Pacific Northwest Traction Company	77.47	471,093	232,399	238,694	37,286	1,327,653	26.999
Pacific Traction Company	24.37	88,305	68,950	19,354	2,738	1,868,875	04.887
Puget Sound Electric Company	65.51	500,632	363,337	137,294	69,633	2,413,055	14.003
Puget Sound International Railway & Power Company	22.06	203,233	137,104	66,128	40,834	4,056,659	58.29
††Puget Sound Traction, Light & Power Company	228.66	3,926,517	2,079,668	1,846,849	601,645	106,214,389	04.658
Seattle, Renton & Southern Railway	24.54	286,728	197,326	89,401	31,596	6,320,641	04.134
Spokane & Inland Empire Railroad	290.42	1,531,650	1,062,704	468,946	150,000	13,762,819	08.289
Tacoma Railway & Power Company	108.06	1,049,659	709,549	340,110	82,358	25,196,765	04.996
Walla Walla Valley Railway	26.50	128,946	91,764	37,182	7,264	1,655,414	06.519
Washington Electric Railway	7.20	1,918	2,107	*188	530		
†††Washington-Oregon Corporation	20.18	100,857	78,012	22,844	26,154	1,342,664	06.917
Washington Water Power Company, city lines	52.39	803,870	761,983	41,887	67,320	18,495,294	04.923
Washington Water Power Company, interurban lines	23.89	102,785	95,915	6,870	4,390	255,557	02.951
Western Washington Power Company	5.60	30,478	25,401	5,077	566	535,588	04.935
Willapa Electric Railway	5.44	33,656	15,998	17,657	2,109		
Yakima Valley Transportation Company	39.19	142,800	117,416	25,383	6,583	2,351,978	04.617

*Deficit.
†Includes Seattle-Everett Traction Company and Whatcom County Railway & Light Company.
††Includes Seattle Electric Company.
†††Includes Twin City Light & Power Company and Vancouver Traction Company.

LOS ANGELES TRANSFER DENIED

Commission Refuses Permission for Los Angeles Railway Corporation and City Railway of Los Angeles to Transfer Properties to The Los Angeles Railway

The California Railroad Commission has issued an order denying the application of the Los Angeles Railway Corporation and the City Railway of Los Angeles for authority to transfer their properties to The Los Angeles Railway. The order provides, however, that the companies may at a later date submit a modification of the present application. Previous references to this application were made in the ELECTRIC RAILWAY JOURNAL of Jan. 31 and Sept. 12, 1914.

Embodied in the present application was a request of The Los Angeles Railway for authority (1) to issue common stock to the par value of $20,000,000 in exchange for $20,000,000 of the capital stock of the Los Angeles Railway Corporation and $5,000,000 of the capital stock of the City Railway of Los Angeles; (2) to execute a mortgage of its properties, and (3) to issue bonds to the face value of $23,544,000 to be exchanged for bonds of the Los Angeles Railway Corporation and of the City Railway of Los Angeles, on outstanding bonds issued by these.

The main question at issue in the application was the value of the two operating companies as compared to the $23,544,000 of bonds to be issued. A valuation of the properties was undertaken in connection with the application, and various estimates of depreciated reproduction value were made, as follows: By the City of Los Angeles, as of Jan. 1, 1913, $14,782,112; by the Los Angeles Railway Corporation, as of Dec. 1, 1913, $24,579,566, and by the engineering department of the commission, as of Dec. 1, 1913, $19,747,767. With regard to the figures submitted by the city of Los Angeles, the engineers who prepared the report stated that it was not prepared for presentation to the commission, and that it was only an engineering estimate. As to the commission's valuation, the decision of the commission says:

"It can fairly be said to be an exhaustive report, and while it is, of course, possible that the final determination of value may increase the figures submitted therein, the commission is not convinced that a showing can be made of a value of applicant's plant equal to the face value of its outstanding bonds."

The commission in its investigation found itself hampered by the absence of many important books of the predecessor companies. In this regard the commission expressed itself as follows:

"The explanation was made that these books had been burned, as it was thought that their usefulness had ended. This does not appear to be a valid explanation. Any man who has served a big public service corporation as long in an official capacity as have certain of the officials of these applicants, either did know or ought to have known the extreme importance of preserving corporate records. The conclusion is justified, therefore, that these books were either destroyed or allowed to be destroyed in order to avoid a public revelation of their contents."

American Cities Company, New York, N. Y.—At the recent annual meeting of the American Cities Company, S. J. Dill, C. H. Hardy, D. D. Curran, Edwin B. Parker and Walter G. Weiss were elected directors to succeed Irving Bonbright, A. J. Hemphill and S. Z. Mitchell, retired, and W. W. Kavanaugh, deceased, and to fill a vacancy.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—Cassatt & Company, R. M. Stinson & Company and Henry & West, Philadelphia, are placing at 98½ and interest, to yield 6.5 per cent, $800,000 of three-year 6 per cent collateral trust notes of the Aurora, Elgin & Chicago Railroad. These notes are dated March 1, 1915, and are due on March 1, 1918, being redeemable before maturity at graded premiums from 101 down to 100¼. They are secured by deposits with the trustee of $1,067,000 of first and refunding mortgage 5 per cent bonds, due 1946, which are a lien on all the property of the company, and upon retirement of an issue of Elgin, Aurora & Southern Traction Company 5's due on June 1, 1916, will become a first mortgage on one-half of the entire property. Following these notes is $3,100,000 of preferred stock giving 6 per cent dividends and the same amount of common stock. The authorization of this issue was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20.

Central Park, North & East River Railroad, New York, N. Y.—The separate answer of the executors of the estate of Thomas Dolan to the suit against Mr. Dolan, P. A. B. Widener and George W. Elkins, in which they are charged with wasting more than $2,000,000 of the assets of the Central Park, North & East River Railroad, was filed on March 5 in the United States District Court in Philadelphia. The principal points of the defense are that these men were not directors during the years when it is alleged they were guilty of neglect of duty; that the transactions complained

of as being illegal were ratified by the stockholders of the company when negotiations were being made, and that the statute of limitations of both New York and Pennsylvania bar such claims as presented in the suit (which are denied as a whole). The establishment of the minority stockholders' right to sue the directors was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 16.

Chicago (Ill.) Elevated Railways.—The Chicago Elevated Railways has deferred action on the quarterly dividend of 1½ per cent on the preferred participation shares, due March 1. Similar action was taken on the Sept. 1 and Dec. 1, 1914, payments. Officials of the company say that the preferred dividend was passed March 1 because the surplus earnings of the company this year are being used for improvements. The gross earnings of the company for the first two months of 1915 were 1 per cent more than for the first two months of 1914. The outlook is now said to be quite promising.

Fairmount Park Transportation Company, Philadelphia, Pa.—Samuel M. Clements, Jr., and William L. Chrisman, two members of the reorganization committee of the Fairmount Park Transportation Company, were recently appointed temporary receivers for the company by the United States District Court. On March 8 the appointments were made permanent. It is stated that the proceeding is an amicable one, in order to carry out the reorganization plan of the company. The details of this plan and its acceptance by the stockholders were noted in the ELECTRIC RAILWAY JOURNAL of Jan. 16, Feb. 27 and March 6.

Fort Wayne & Springfield Railway, Decatur, Ind.—Pursuant to a judgment and decree of the Adams Circuit Court of Adams County, Ind., French Quinn, receiver of the Fort Wayne & Springfield Railway, will offer the property of the company for sale on May 4 at the court house in Decatur. The sale is to be free of liens except taxes and the Calhoun Street improvement assessment in Fort Wayne. All bids must be accompanied by a deposit of $1,000 in cash or by certified check.

Hudson & Manhattan Railroad, New York, N. Y.—The directors of the Hudson & Manhattan Railroad have declared an interest payment of 1 per cent on the company's adjustment income bonds for the six months ended Dec. 31, 1914, payable on April 1 at the office of Harvey, Fisk & Sons. This is the same interest rate that was used for previous half-years.

New York (N. Y.) Railways.—The arbitrators who will decide the amount of interest to be paid on the New York Railways adjustment income 5 per cent bonds for the six months ended Dec. 31, 1914, are H. H. Porter, of Sanderson & Porter; James Marwick, of Marwick, Mitchell, Peat & Company, and W. G. Ross, one of the directors of the Montreal (Que.) Tramways. Mr. Porter was chosen by the New York Railways, Mr. Marwick by the trustee of the mortgage, and Mr. Ross, the third arbitrator, by the first two. These are the same experts who arbitrated the question of interest last year. The payment on the bonds for the last half of 1913 was 2.345 per cent, and the total for the year was 3.98 per cent, while the rate for the first six months of 1914 was 1.288 per cent.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—The annual report of the Petaluna & Santa Rosa Railway for the year ended Dec. 31, 1914, shows that the gross earnings decreased from $303,645 to $298,224, while the operating expenses increased from $202,621 to $213,783, consequently giving a decrease in net earnings from $101,023 to $84,440. The fixed charges rose from $58,221 to $60,421, so that the surplus dropped from $42,801 to $24,018. A fire loss of $14,138 in 1914, and other adjustments, further reduced that year's surplus to $11,017. During the year the railway passengers increased from 733,538 to 757,759 and the freight from 61,968 tons to 70,265 tons.

Public Utilities Company, Evansville, Ind.—Announcement has been made by the Public Utilities Company, which is the assignee and vendee of the Evansville & Princeton Traction Company, that the trustees under the mortgage of April 1, 1903, will on April 1, 1915, at the office of the Citizens' Saving & Trust Company, Cleveland, receive at 105 and accrued interest, bonds 71 to 80, inclusive, issued by the Evansville & Princeton Traction Company.

United Railways Investment Company, San Francisco, Cal.—The directors of the United Railways Investment Company have changed the fiscal year of the company to start with July 1, and the annual meeting this year will be held in October instead of May. This will enable the company to issue its annual report in consolidated form for itself and its subsidiaries. A balance sheet and an income statement for the year ended Dec. 31, 1914, will be sent to stockholders this month, but the complete pamphlet report will not be issued until October.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, preferred.

Brockton & Plymouth Street Railway, Plymouth, Mass., 3 per cent, preferred.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred, series A.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, three-quarters of 1 per cent, second preferred.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West End Street Railway, Boston, Mass., $1.75.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan.,	'15		$144,145	*$136,100	$8,045	$2,989	$5,056
1 " "	'14		152,762	*142,642	10,119	347	9,772
7 " "	'15		1,241,521	*1,060,747	180,775	24,670	156,105
7 " "	'14		1,289,952	*1,058,040	231,912	2,429	229,483

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Jan.,	'15	$425,900	$12,929	$412,972	$40,833	$372,139	
1 " "	'14	414,759	3,586	411,174	29,167	382,007	
12 " "	'15	3,945,594	126,251	3,819,344	431,667	3,387,677	
12 " "	'14	2,417,181	83,215	2,333,966	152,229	2,181,737	

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILROAD, CLEVELAND, OHIO.

1m., Jan.,	'15	$93,315	$59,158	$34,157	$32,053	$2,104
1 " "	'14	94,052	60,141	33,911	31,895	2,016

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Dec.,	'14	$489,345	*$194,720	$294,626	$33,648	$260,978
1 " "	'13	502,473	*209,909	292,564	37,458	255,106
6 " "	'14	2,715,265	*1,117,709	1,597,556	208,283	1,389,274
6 " "	'13	2,741,203	*1,171,218	1,569,985	201,263	1,368,722

INTERBOROUGH RAPID TRANSIT, NEW YORK, N. Y.

1m., Jan.,	'15	$2,878,732	$1,327,436	$1,551,296	$912,571	‡$686,354
1 " "	'14	2,933,870	1,312,684	1,621,186	912,671	‡752,765
7 " "	'15	19,149,437	8,731,614	10,417,823	6,372,390	‡4,376,309
7 " "	'14	18,933,323	8,698,179	10,606,136	6,580,797	‡4,025,339

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., Jan.,	'15	$280,839	$181,979	$98,860	$65,758	$33,102
1 " "	'14	270,961	171,291	99,670	64,034	35,635

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEXAS

1m., Dec.,	'14	$162,561	*$87,543	$75,018	$28,698	$46,320
1 " "	'13	184,876	*102,572	82,304	24,052	58,252
12 " "	'14	2,071,099	*1,151,237	919,861	317,503	602,358
12 " "	'13	2,132,200	*1,179,941	952,259	286,918	665,341

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., Dec.,	'14	$20,107	*$12,608	$7,499	$7,251	$248
1 " "	'13	26,291	*15,020	11,271	7,062	4,209
12 " "	'14	264,841	*168,793	95,048	86,728	8,320
12 " "	'13	285,758	*182,738	103,020	81,102	21,918

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., Dec.,	'14	$717,550	*$415,775	$301,776	$177,741	$124,035
1 " "	'13	790,307	*435,126	355,181	174,407	180,774
12 " "	'14	8,450,974	*5,007,008	3,443,966	2,118,856	1,325,110
12 " "	'13	8,613,599	*5,008,375	3,605,224	2,063,019	1,542,205

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Jan.,	'15	$769,292	$531,540	$237,752	$53,000	$184,752
1 " "	'14	746,006	493,609	252,397	49,615	202,782

*Includes taxes. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Cities and Legislatures Striving for Adequate Regulatory Measures—The "Jitney" Finishes Its Sweep of the Country in Less Than Four Months

The features that stand out prominently this week in connection with developments involving the "jitney" are the veto by the Mayor of Los Angeles of the regulatory measure there and the decision of Judge W. A. Sloane of the Superior Court at San Diego denying the application of the city for an injunction against the Red Star Auto Bus Company and holding that buses are not required to obtain a franchise in San Diego although subject to regulation by ordinance.

The much-revised ordinance to regulate the operation of "jitney" buses in Los Angeles was passed unanimously by the City Council on Feb. 27. On March 3, Mayor Rose vetoed the ordinance, holding that the measure was insufficient and not fully calculated to remedy traffic conditions. The ordinance did not limit the fare to 5 cents. This was regarded as due to the comment of Councilman Conwell, who said: "It is a physical impossibility to operate the cars (the 'jitney' buses) at a profit. The owners tell us that the passengers on the running boards are the profits of the business. The truth is that these passengers are a loss, for they destroy the light cars and cause an expense in repairs and maintenance that would greatly offset the gross revenue. The 'jitney' is here to stay, but its mission is rapid transit de luxe and not a 5-cent proposition."

The Los Angeles ordinance provided in short that permits should be secured from the Police Commissioners; that all applicants take examinations and demonstrate their ability properly to handle cars in the congested districts and give bond in the sum of $5,000; that drivers file photographs of themselves for identification; that all permits set forth routes; that drivers be permitted to deviate three blocks either way to deliver passengers to their homes; that all buses be equipped with non-skid tires and with non-skid chains in wet weather; that in congested districts buses stop 50 ft. from street intersections to discharge or take on passengers and 75 ft. at intersections where street cars turn on or off the street; that the interior of buses be lighted; that regulation signs be carried, showing the route and fares charged; that passengers be permitted to stand on the running board next to the driver's seat; that no color line be drawn, and that hand baggage be held in the laps of passengers.

In his veto message Mayor Rose said that 2093 rent permits for automobiles and 2487 public chauffeur licenses had been issued since April 17, 1914. Before the "jitney" bus started in Los Angeles the total number of automobile permits issued was 350. On Dec. 31, 1914, 600 "jitney" bus permits were not renewed. Since Jan. 1, 1915, 300 had dropped out of business. There were permits, however, at the present time for 700 "jitney" buses. He said that these buses averaged 130 miles a day, which meant about sixteen one-way trips during the rush hours when the traffic was heaviest. In round numbers this meant 11,200 trips every day, equivalent to adding 11,200 vehicles during rush hours to streets already choked with traffic pertinent to the business conducted upon the streets. It seemed to him extremely unfair and unjust to the merchants and taxpayers to inflict this additional burden upon the thoroughfares without their consent, against their wishes and greatly to their detriment. The Mayor recommended the amendment of the ordinance so as to increase the indemnity bond from $5,000 to $10,000 for the reason that while $5,000 might possibly recompense one injured person there was no assurance that injury would be confined to one or even two persons. He further recommended that in the event of the passage of a "jitney" bus ordinance, a special commission should be created to examine applicants for permits.

As previously stated, Judge Sloane at San Diego held that "jitney" buses operating along the streets of that city were not required to obtain a franchise from the city. Judge Sloane held in short that the "jitney" bus does not actually appropriate any part of the highway which it traverses and that it is not therefore subject to the present franchise law. He admitted the power of the Legislature to enact a law giving municipalities the right to require franchises, but said this power was not now vested in the municipalities. He said in this connection:

"It appears to me that the city of San Diego has ample authority under its police power to place practically every restriction and requirement upon the auto bus traffic that would be available under the limitations of a public franchise."

In conclusion the Judge said:

"It would seem, therefore, to be well within the province of the police powers of the city of San Diego to regulate the traffic on the streets not only to avoid congestion and maintain a proper distribution of travel, but to promote and preserve the highest efficiency and safety in the matters of public transportation."

Another important development in connection with the move for the regulation of the bus was the hearing before the Massachusetts Legislative committee on mercantile affairs held on March 4 upon the bill introduced by the Massachusetts Street Railway Association to license private bus lines and place them under the jurisdiction of the Public Service Commission. Bently W. Warren, counsel for the association, outlined the features of the bill, which was summarized in the Electric Railway Journal of Jan. 30, 1915, page 258. The bill provides for licensing automobiles carrying eight or more passengers for hire and secures recovery for damages to passengers, through the jurisdiction of the Massachusetts Highway Commission. A road tax is also included, graduated according to weight. Mr. Warren pointed out that the electric railways represented in the Massachusetts Association desired protection against irresponsible agents of transportation and touched upon the menace of the "jitney" to existing transportation companies, which are responsible agents and cannot do a haphazard business. If the street railway could pick its own hours for operating as the "jitneys" do, the railways would not be seeking legislation. He suggested that if committees could not find time to go into the matter thoroughly before the close of the present session, it might be well to call for an investigation by a recess committee or special commission, with report at the next session. Many representative business men also appeared. In general the speakers declared that they were satisfied with the existing electric railway service in their communities; that the entrance of the "jitney" had proved a menace to the safety of the public, and that the operators of the "jitneys" should be held rigidly responsible in attempting to perform the duties of common carriers.

The demand for proper regulation has been extremely insistent elsewhere. Besides the bill introduced into the Legislature of Indiana and lost, and the bill introduced into the Massachusetts Legislature, just referred to, measures have appeared in the Kansas and the New York Legislatures. The original "jitney" bill in the Kansas Legislature was killed by the railroad committee of the Senate after having successfully passed the House. This measure, amended, has been revised and is expected to be reported out of committee and put on the calendar. In connection with the bill introduced in the Legislature of New York on March 5 it may be recalled that in the annual report of the Public Service Commission for the Second District of New York that commission recommended that auto buses be removed from regulation by it, saying that "a year's experience with auto bus lines has convinced us that the law making them common carriers and subject to the regulations of the commission should be repealed." In this connection the commission said that 142 applications for certificates of public convenience and necessity for these lines had been made to the commission up to Jan. 1 and that not one of them, when the application was in proper form and when the route lay over State or county highways, had been denied. The measure now before the Legislature introduced by Senator Thompson prohibits a belt line, stage route, vehicle line or any vehicle carrying passengers at the rate of fare of 15 cents or less for each passenger within the limits of a city, or in competition with another common carrier which is required by law to obtain the consent of the local authorities of a city to operate over the streets of such city from operating over any street in any city, except New

York City, or from receiving a certificate of public convenience and necessity until the owners of such routes or lines shall have procured, after public notice and hearing, the consent of the local authorities of the city.

It is reported generally that a bill is to be introduced into the State Legislature of Tennessee providing for a State tax of $150 annually on each "jitney" bus operated in Tennessee. Of the proposed tax it will probably be provided that $50 shall go to State highway fund, $50 to the county road fund, and $50 to the city street fund.

The ordinance providing rigid restrictions for "jitney" automobiles and buses has been passed to third reading by the City Council of Portland, Ore. It provides for the regulation of "jitneys "until Sept. 1 on a license or permit basis. After Sept. 1 the measure stipulates as a requirement a franchise from the city if they continue in operation. The special licenses which are to be required will permit the operation on the one route. Licenses are to be revoked for cause. The route is to be designated and operation on other streets is to be prohibited. Streets to be used for "jitneys" are, as far as possible, to be unoccupied by street cars. Changing of routes by any "jitney" driver can be made only on written application sent to the Commissioner of Public Utilities, who is empowered to refuse to license a driver when additional bus service appears not to be needed. The "jitney" must operate continuously every day from 6 a. m. to 12 o'clock midnight except Sundays, when service may start at 7 a. m. The rate of fare is to be not more than 5 cents. No car is to carry passengers in excess of the seating capacity. License fees of $5 a month for a car carrying eight or fewer passengers and $10 a month for a car carrying more than eight passengers are to be collected monthly. A bond for the protection of passengers is to be exacted. The route of each car is to be painted on the windshield and on each side of the car. A fine of not more than $200 or ninety days in jail is to be exacted for violation of the ordinance.

In Louisville the finance committee of the lower board of the General Council is considering an ordinance which would fix licenses to be paid by owners and drivers of buses. According to the first chapter of the measure any person, firm or corporation engaged in the business of carrying passengers via automobiles or other power-driven vehicle in Louisville or who should use his automobile or other power-driven vehicle for such purpose must procure a license for each vehicle. The fee is fixed at $25 a year for a vehicle of a capacity of not less than two or more than six passengers, at $35 for a vehicle with a seating capacity of not less than seven or more than ten passengers, and $50 for vehicles with a seating capacity of more than ten passengers. License tags are to be conspicuously attached to each car. Penalties to be assessed for violations of the measure range from $5 to $10 for each offense.

In Nashville, Tenn., a "jitney" regulatory measure has passed the Board of City Commissioners on its third reading. It contains a number of provisions that are restrictive in the extreme. A license fee of $60 is required. Applicants must first undergo an examination as to their ability and the condition of their cars. Each license holder must deposit a $5,000 insurance policy with the city. Drivers must not smoke or drink intoxicants while on duty, and in cases of a special attraction not more than half of the cars regularly run on any route may be deviated to that service. A maximum fare of 5 cents is allowed and each car must bear a sign indicating in plain letters the route it traverses. To secure a license to operate an automobile and carry passengers, the driver must be eighteen years of age.

The licensing of cars under the new ordinance passed at Fort Worth, Tex., was begun immediately after the measure went into effect. Up to the time the new ordinance became effective 269 "jitney" licenses had been issued.

Recent developments in the public discussion of the ordinance to regulate "jitneys" now pending before the Council of Atlanta, Ga., would seem to indicate conclusively that the real influence behind the spread of the movement is the automobile interests, focused by local dealers, agents and branch managers. Many of these latter are advertisers and the newspapers appear to be sympathetic for their welfare.

The "jitney" has apparently completed its sweep of the country. Starting in Los Angeles the movement spread north and south simultaneously, cars appearing in the States of Washington and Texas about the same time. Then came the invasion of the Southern states, cars appearing in New Orleans, Birmingham, and other cities. The spread of the "jitney" idea is perhaps best instanced by reference to the "jitney" bus item which appeared in the ELECTRIC RAILWAY JOURNAL of Nov. 28, 1914. The correspondent of the ELECTRIC RAILWAY JOURNAL at San Francisco said in substance at that time that there had recently been an enormous increase in the number of privately owned automobiles that solicit fares at 5 cents each on the streets of Los Angeles and that the public utilities committee of the city announced it would hold a public hearing on Nov. 27 to consider the matter. Since then the development has been followed from week to week in the ELECTRIC RAILWAY JOURNAL.

Among the cities "Farthest North" that report the installation of "jitney" bus services are Erie, Pa., Buffalo, N. Y., Rochester, N. Y., Portland, Me., and Toronto, Ont. In the South, Richmond is among the additional cities which have been invaded. A few days ago it was announced that the "jitney" service in St. Louis would be augmented by twenty-five "jitneys" placed in operation by the St. Louis Rapid Transit Company, under the supervision of Lee Massingale, for many years associated with the United Railways.

That the service of the "jitneys" broke down lamentably during the recent storm in the Central West is instanced by the report received from the Kansas City correspondent of this paper. The Metropolitan Street Railway of that city had to contend with a fall of snow totaling more than 1 ft. on the evening of March 4 and the following day. There was interruption of traffic early in the evening on some lines, but sweepers kept the tracks clear during the night. On March 5 the greatest difficulty was in the wagon and automobile traffic that obstructed the center of the street where the street railway had cleared the way. The Park Board had cleared many of the boulevards, but snow piled at intersections caused most traffic to stick to the street railway track. The storm kept the "jitneys" indoors during the afternoon and evening of March 4, and on the morning of March 5 only a few of the small cars and none of the large ones ventured out. When the cars did begin to reappear they made for the spaces cleared by the street railways. In this connection the following account from the Kansas City *Journal* of March 5 will be appreciated:

"The heavy fall of snow yesterday and last night did not seriously disarrange the schedules of the 'jitney' service. Those who feared that the drifting snow would make the streets impassable for the cars were unaware of the resourcefulness of the 'jitney' management. As soon as the drifts began to impede the progress of the 'jitneys,' heavy fourteen-cylinder motor trucks, with revolving sweeper attachments, were brought into service and the routes traversed by the different 'jitneys' were soon swept clean. The sweepers were followed by sand sprinkling cars, and inclines and curves were heavily sanded to prevent skidding.

"While passengers shivered in the movable dungeons operated by the soulless Metropolitan Street Railway, it was a pleasure to note that the 'jitneys' maintained a degree of summer heat through the use of electric warmers and toasters. The 'jitney' has again demonstrated that neither rain, nor hail, nor snow, nor callous criticism can keep it in its cozy garage. It can traverse the rain-flooded streets like a duck across a placid pond and it can negotiate a snowdrift like a Norwegian on skis. It is warm in winter, cool in summer, and a joy and a delight forever. If the Metropolitan Street Railway management would desist from sowing the streets with tacks and horseshoe nails and broken glass the 'jitney' management might say, with the late lamented Mr. Dana:

"We may be happy yet,
You bet."

This story was headed "As Written by A. Ananias—Being a Reversed English Account of the 'Jits' and Snow."

Fixed responsibility in the "jitney" bus business, so far as it applies to cities of the first class, is provided in a bill backed by the road and bridges committee which passed the Washington House on March 1. The new act requires a

bond of $1,000 to be filed with the Secretary of State upon application for a license, for which a fee of $5 will be charged. No other fee will be exacted during the life of the bond. The bill in no way interferes with future control of the "jitneys" by municipal authorities. The first section of the bill makes it unlawful for any person, firm or corporation, other than a steam, street or interurban railway to transport passengers for hire in any motor propelled vehicle on any public street or highway within the corporate limits of a city of the first class without having first obtained a license.

The auto bus line in Jamaica, L. I., which is included in the Borough of Queens, Greater New York, has suspended service. Jamaica has a population of approximately 100,000 people and it is an important terminal and junction point on the Long Island Railroad. It is served by the lines of the Brooklyn Rapid Transit Company, the New York & Queens County Railway and the Manhattan & Queens Traction Corporation, but the service of all of these lines is through service rather than local. The grant by the New York Board of Estimate of a franchise to the Jamaica bus line was an experimental one, and two cars were operated in a purely local Jamaica service. The line, according to reports, has never succeeded in paying even its running expenses, the operations being handicapped by insufficient equipment.

BROOKLYN TRANSIT INQUIRY

D. A. Marsh, of counsel for the Brooklyn (N. Y.) Heights Railroad and other surface companies involved in the Public Service Commission's investigation predicated upon the report of Joseph Johnson, chief of the transit bureau of the commission, made his final argument on March 8 before the commission, summing up the testimony and the company's contentions in the case. Mr. Marsh presented to the commission a brief in which he said:

"The companies protest on behalf of their stockholders that the present investigation has been wholly superficial and is entirely inadequate as a basis on which to frame a general service order which may jeopardize the corporate property and may even spell financial ruin to those corporations.

"Experienced railroad men, and, we believe, competent men, are doing their level best to give the best possible service in Brooklyn under existing conditions. This has been publicly admitted by at least two of the members of this commission who had sufficient backbone to face criticism and express their honest convictions. It may be interesting to the commission to know that E. G. Connette, president of the International Railway, Buffalo, and formerly in the employ of the commission, in a recent address is reported to have stated, in justification of the service given on his road, as follows: 'With the exception of Brooklyn, we have the most scientific schedule of any road in the country.'

"The transit bureau admitted upon the hearing that in making up its report it had considered neither the effect of the new rapid transit lines now under construction, the variations in travel resulting from the new transfer system, nor the question whether the company was financially able to furnish the service proposed in the report. Neither had standards of service elsewhere been taken into consideration.

"The new transfer system went into effect on June 1, 1914, giving practically universal transfers at all intersections, including the lines of the Coney Island & Brooklyn Railroad, which was a short time before made a part of the Brooklyn Rapid Transit System. As a result of this new transfer system the travel immediately began to shift, and is still shifting."

The December Grand Jury, which had been investigating the Brooklyn Rapid Transit Company, reported to County Judge Hylan on March 6, roundly censured the Public Service Commission, and referred to the instances of inadequate service, but it failed to indict. Judge Hylan said: "If the conditions in this borough do not improve, I shall get the evidence and present it to some future Grand Jury. You must not think I regard your investigation as a fruitless one. The Public Service Commission has been stirred into action; the legislative committee has investigated and the health department has also taken action."

IMPORTANT INTERCHANGE DECISION

The United States Supreme Court, in a decision handed down on March 8, upheld the order of the Michigan Railroad Commission to require the Michigan Central Railroad to make a physical connection with the interurban line of the Detroit United Railway at Oxford, Mich. The decision is interpreted to mean that the Railroad Commission has authority to order physical connections and the interchange of traffic between steam and electric lines throughout the State, a power which has been questioned by the steam railroads up to this time. There are a number of places in the State where physical connections of this kind are desired by shippers in order to facilitate the handling of freight and it is expected that application for such connection where practicable will be made by interested shippers. The electric line affected by the decision runs from Detroit to Flint, and from Oxford to Flint it has been equipped with water tanks and other necessities for locomotive use in order that locomotives may be operated on the division if necessary. The line is suitable for freight car operation in that it runs on private right-of-way entirely except through the villages en route.

CHICAGO SERVICE ORDINANCE

A service standard ordinance for non-rush hours, the provisions of which were printed in the ELECTRIC RAILWAY JOURNAL of March 6, page 486, has been passed by the Chicago City Council. In compliance with the findings of the Board of Supervising Engineers more than a year ago regarding equipment requirements to take care of the increase in traffic in Chicago, the local transportation committee passed an order that a contract be made immediately for the purchase of 168 new cars. In addition it ordered that a contract be made so that fourteen additional new cars will be delivered each month until February, 1916, making a total of 336 cars to be purchased and delivered before that date. In connection with car purchases, a movement has been instigated by the labor unions to require the Chicago Surface Lines to purchase Chicago-built cars. A resolution was passed by the local transportation committee indorsing this policy, and by motion it was decided to hold a conference on this subject between the committee, the officials of the Chicago Surface Lines and the Board of Supervising Engineers to determine what could be done.

CAR-FULL SIGNS IN BROOKLYN

T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, notified the board of health that he would comply with orders issued prohibiting overcrowding on the Graham Avenue line. Colonel Williams in a letter declared the order to be illegal and unjust and has requested a hearing at which the company's side can be presented, but promised that the order would be complied with pending the action of the board of health on the hearing.

The company, under protest, put the recommendation into effect on March 8. Large placards were posted on the cars of the Graham Avenue line announcing that the board of health had forbidden the carrying of more than half as manay standees as seated passengers, thus limiting the capacity of the cars to fifty-four. The conductors were furnished with metallic signs to be hung on the gates as soon as a car had fifty-four passengers. They read: "No more passengers on this car, by order of the board of health." The conductors were also instructed to close the gates as soon as the required number of passengers had boarded the car and to use every means except force to prevent that number from being exceeded. Policemen were stationed along the line to see that the public regarded the order. It was generally regarded that many of the patrons who ordinarily use the Graham Avenue line took to the cars of the Flushing and Flushing-Knickerbocker lines, which operate over the same route as the Graham Avenue cars between the Brooklyn Bridge and Broadway. Special precautions were taken by the police to preserve order at the loop at the Manhattan end of the Brooklyn Bridge at which the Graham Avenue and Flushing Avenue and Flushing-Knickerbocker Avenue cars are turned for the trip back to Brooklyn.

Ordinance Against Smoking.—The City Council of Butte, Mont., has passed an ordinance prohibiting smoking in closed street cars. The ordinance provides fines ranging from $5 to $25 for violations.

Examination for Promotion.—An examination of conductors and motormen of the San Francisco (Cal.) Municipal Railway system who are eligible for promotion to the position of inspectors will be held by the Civil Service Commission on March 20.

Near-Side Cars in Buffalo.—Cars of the P-A-Y-E near-side type are now being operated on all except three of the lines of the International Railway in Buffalo, and many similar cars are now in operation on the company's lines in Niagara Falls and Lockport.

Methuen Service Finding.—The Massachusetts Public Service Commission has ordered the Bay State Street Railway to install a double track in Methuen between the intersection of Hampshire and Lowell Streets and Railroad Square, to relieve rush-hour congestion.

Fare Increase Proposal Lost.—On March 5 the Board of Control of Toronto, Ont., refused to concur in the recommendation of Works Commissioner Harris for increasing the fares on the Toronto Civic Railway in order to place the municipal lines on a self-sustaining basis.

Bundle Day in Louisville.—The Louisville (Ky.) Railway on Feb. 25, which was "bundle day" in that city, supplied two cars which stopped before certain of the school houses of the city and gathered up the bundles which accumulated there, delivering them at certain depots on the company's lines where they were assembled for distribution among the poor.

Air Tests in Cleveland.—On the order of Health Officer Ford of Cleveland, Ohio, City Chemist White will investigate the ventilation of street cars and the possibility of their being distributors of pneumonia and grip germs. The records show that there was a very material increase in the number of cases of pneumonia in February over the same month last year.

Reduction in Accidents in Lexington.—According to a statement issued by F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, Lexington, Ky., there has been only one accident on the city lines of the company since the front-entrance-only system was put into effect last summer, while there were twenty-five rear step mishaps in 1912 and thirty-two in 1913.

Contest of Service Order.—Refusing to obey the orders of the Public Service Commission of the First District of New York directing the operation of additional trains on its road, the Long Island Railroad has served the commission with a writ of certiorari to certify to the Supreme Court the records in the orders for review by the court. The company claims that the orders were unwarranted, unreasonable and arbitrary.

Parcel Checking.—In the principal ticket offices of the Northern Ohio Traction & Light Company, Akron, Ohio, a uniform charge of 5 cents has been established for checking hand baggage or parcels left to be called for. In some instances, a charge of 10 cents was formerly made, and this is the rate prevailing in many places. The accommodation of interurban patrons is the object sought to be attained. The 5-cent charge is expected to do no more than cover the cost of the service.

Adjustment Under Gentlemen's Agreement.—As a result of the so-called "gentlemen's agreement" entered into between E. G. Connette, president of the International Railway, Buffalo, N. Y., and representatives of various business men's organizations, the company has placed additional cars in service during the rush hours in the morning and in the evening. At several points in the downtown section of the city extra cars are stationed so that, if they are needed, they can easily be switched onto the main line of traffic.

Crusade Against Spitting.—A crusade against spitters has been conducted quietly by the board of health of New York since Jan. 1, summons having been served on all found violating the law against this practice. According to the department 239 persons were summoned, and only fifteen discharged in the first two months of the year, the majority being fined from $1 to $5, the total amount received being $192. The detailed statement is as follows: Number of persons summoned to court, 239; fined, 159; sentence suspended, fifty-two; discharged, fifteen; cases pending on March 4, thirteen.

Car Capacity Controversy.—Mayor Church of Toronto, Ont., at the meeting of the Board of Control on March 3 submitted a motion regarding overcrowding on street cars on which the corporation counsel will be asked to report. It deals with three points: first, that the present city by-law allowing 50 per cent of standing room in excess of the seating capacity be repealed; second, that the city oppose the application of the Toronto Railway to the Ontario Railway & Municipal Board for an order confirming this by-law, and third, that the attorney-general be requested to proceed with the indictments against the Toronto Railway for alleged overcrowding.

Rates Under Advisement.—The Public Service Commission of the State of Washington has taken under advisement the suit of the city of Seattle against the Puget Sound Electric Railway, operating from Seattle to Tacoma, to require the company to carry passengers for a 5-cent fare within the limits of Seattle. The contention of the city is that the line should be considered a street railway inside the city limits. The company took the position that it is operating an interurban railroad between Seattle and Tacoma and that the State law does not apply to this case. At present passengers traveling to Georgetown, Davis and other stations on the Puget Sound Electric Railway within the limits of the city of Seattle pay 9, 12 and 14 cent fares based on distances.

Creating Bus Sentiment.—Magistrate Barlow, sitting in the West Side Court in New York, dismissed on March 4 two employees of the People's Five-Cent Bus Company, charged with operating vehicles bearing an advertisement asking for public support of a franchise, in violation of Section 41 of the corporation ordinances. The magistrate decided that the matter was one of civil, not of criminal, procedure. Along one side of the car is painted the following legend: "Why hang on a strap, when the People's Five-Cent Bus Company offers a seat to each passenger in its electric automobiles for a 5-cent fare? The Board of Estimate knows the answer, ask them." On the other side the legend reads: "You may ride in this bus for a 5-cent fare if the Board of Estimate will permit you to use your streets."

Memphis Transfer Case.—The Memphis (Tenn.) Street Railway transfer case has been argued before the Court of Appeals and submitted to that body for its decision. It involves the question whether the railway must issue transfers on street railway tickets sold at eleven for 50 cents. The hearing is on appeal from the lower courts which found for Thomas Dies, commissioner of public utilities, grounds and buildings, in his suit for mandamus. Charles M. Bryan, city attorney for Memphis, argued that under the franchise under which the railway is operating it can be compelled to issue transfers. Luke E. Wright, former secretary of war, for the company, contended that the refusal of the company did not mean violation of any law and that if the company were compelled to issue transfers on the lower rate it could not make expenses.

Safety First League in Louisville.—Organization of a safety first league to include all the employees of the public utility corporations of Louisville, Ky., is expected to result from a joint meeting held in the chapel of the Louisville Railway. There were 300 delegates present from the railway, the Louisville Gas & Electric Company, the Cumberland Telephone & Telegraph Company and the Home Telephone Company. Although definite steps looking toward the formation of the league were not taken, arrangements were made for other meetings. Moving pictures and stereopticon views were explained by A. W. Lee, chairman of the safety first committee of the employee's league of the Louisville Gas & Electric Company. Samuel Riddle, superintendent of transportation of the Louisville Railway, and Frank H. Miller, chief engineer of the company, were the principal speakers. Among the others who addressed the meeting was Donald McDonald, vice-president and general manager of the Louisville Gas & Electric Company.

Personal Mention

Mr. Harro Harrsen, managing director of the Mexico City (Mexico) Tramways Company, spent a few days in New York last week on his way to London where he expects to meet Dr. F. S. Pearson, president of the tramways.

Mr. William Parker, heretofore inspector of the Hamilton (Ont.) Street Railway, has been appointed superintendent to succeed Mr. J. Pearson, who resumes his former position of chief inspector and will, in addition, act as assistant superintendent.

Mr. W. H. Taaffe has been appointed chief of the division of capitalization of the Public Service Commission for the Second District of New York to succeed Mr. H. C. Hopson, who has established himself with offices in New York as a public utility and railway expert.

Lieut.-Col. E. W. Rathbun, president of the Oshawa (Ont.) Railway, was given a farewell by the citizens of Deseronto, Ont., on Feb. 13. He has been appointed to the command of the Sixth Artillery Brigade, and will sail with the second contingent for service in Europe.

Mr. W. R. Hall, manager of the Anniston Electric & Gas Company, Anniston, Ala., has been appointed manager of the North Alabama Traction Company, New Decatur, Ala. Several years ago Mr. Hall was the general manager of the company at New Decatur. He then became general manager of the Sheffield (Ala.) Company. Subsequently he became connected with the Anniston Electric & Gas Company as general manager.

Mr. H. C. Prather has been appointed assistant general manager of the Empire United Railways, with offices in the Electric Railway Terminal Building, Syracuse, N. Y. Mr. Prather heretofore has been local manager of the Rochester Division. Under the new arrangement Mr. Prather's jurisdiction includes the Oswego Division of the Empire United Railways. Prior to becoming connected with the Empire United Railways Mr. Prather was general manager of the Buffalo, Lockport, & Rochester Railway.

Mr. Samuel Gausmann, roadmaster of surface lines of the Brooklyn (N. Y.) Rapid Transit System, has resigned to enter business for himself in Brooklyn as a street railway track and paving expert. He will specialize in preparing estimates, arranging contracts and supervising work in this field. Mr. Gausmann began his railway career with the Middletown & Goshen Traction Company some twenty years ago. He resigned as superintendent of that road in 1901 to go to the Brooklyn Rapid Transit System as foreman in the way and structure department. In 1911 Mr. Gausmann was appointed roadmaster of surface lines.

Mr. E. L. Mathews, hitherto assistant engineer of the way and structure department of the Brooklyn (N. Y.) Rapid Transit System, has been appointed engineer of surface lines. This position is a new office embracing in its scope the duties of roadmaster of surface lines. The latter position was abolished with the resignation of Mr. Samuel Gausmann, as noted elsewhere in this column. Mr. Mathews was formerly engineer of way and structure of the Coney Island & Brooklyn Railroad, to which position he was appointed in 1908. He joined the Brooklyn Rapid Transit System when the company absorbed the Coney Island & Brooklyn Railroad in 1914. Previous to coming to Brooklyn Mr. Mathews was with Newhall & Company, railway contractors, Baltimore, Md., his native State. While with that firm, Mr. Mathews had charge of general construction work in different sections of the country.

Mr. W. O. Woodward, who has been traffic manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., for the last five years, has resigned. Mr. Woodward began his railway career with the Pennsylvania Railroad in 1901, and later became connected with the Lake Erie & Western Railroad, where he served until 1905 in various capacities in the freight department. In November, 1905, he accepted a position in the accounting department of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., and subsequently served in the passenger and freight departments of the company. For a short time Mr. Woodward acted as division freight and passenger agent of the Ohio Electric Railway, at Dayton, Ohio, but returned to the Terre Haute, Indianapolis & Eastern Traction Company. In March, 1909, he was appointed traffic manager of the Indianapolis, Crawfordsville & Western Traction Company, with which he remained until 1910.

Mr. William Clapper, whose appointment as traffic manager of the Inteurban Railway, Des Moines, Ia., to succeed Mr. C. T. Chapman was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 27, is a native of Des Moines and a traffic man with wide experience in the steam railroad field. He began railroad service in June, 1899, as clerk to the commercial agent of the Minneapolis & St. Louis Railroad at Minneapolis, Minn. Mr. Clapper remained in that position until January, 1900, at which time he returned to Des Moines to become chief clerk to the commercial agent of the Wabash Railroad. In 1904 he was made contracting freight agent of that company with headquarters at Des Moines, and in October, 1907, upon the resignation of the division freight and passenger agent, he succeeded to that position, in which he served until March 1, 1915. In the latter position Mr. Clapper had charge of both freight and passenger traffic in Iowa.

Mr. W. P. Strandborg of the staff of the *Evening Telegram* of Portland, Ore., has been appointed to direct the work of the publicity department of the Portland Railway, Light & Power Company, Portland, Ore., which has been re-established. Mr. Strandborg has for fifteen years been in continuous service in the newspaper field in the East and on the Pacific Coast. He has been a member of the editorial staff of the *Evening Telegram* for the last nine years. Among the organizations of Portland of which he is a member are the Portland Ad Club, Portland Press Club, Portland Automobile Club, Progressive Business Men's Club, Portland Transportation Club, the Portland Social Turn Verein and the Elks. He was the founder and is the head of the Ancient Order of Muts. President F. T. Griffiths, of the company, in announcing the appointment of Mr. Strandborg, said that the policy of the company would be to conduct a permanent information service, an important phase of which would be to keep the public advised of the part the company is playing in the study of permanent development of the city and adjoining territory served by the corporation.

Mr. O. A. Honnold has resigned as electrical engineer of the Utah Light & Traction Company, Salt Lake City, Utah, until recently the Utah Light & Railway Company. Mr. Honnold was graduated from Purdue University. After two years in power-house construction and operation with the Citizen's Street Railway, Detroit, Mich., Mr. Honnold in 1896 took charge of miscellaneous engineering and operating work and helped to carry out the consolidation of several power companies and street railways in Salt Lake, Ogden and vicinity. After the late Edward H. Harriman bought out the light, power and street railway interests in 1906, Mr. Honnold did the electrical engineering work and had charge of all electrical construction and reconstruction in connection with rebuilding the old properties. He also had charge of all of the stations and transmission lines and distribution operating departments. In resigning from the Utah Light & Traction Company Mr. Honnold concludes nineteen years of work at Salt Lake, with the exception of two years, from 1900 to 1902, when he was with the Lachine Rapids Hydraulic & Land Company, at Montreal, Can. Between $7,000,000 and $8,000,000 was spent in improvements made on the property under Mr. Honnold's supervision at Salt Lake from 1907 up to 1914. Mr. Honnold expects to spend several months in taking a vacation and will then look after his own interests in the West.

Mr. Charles C. Elwell has been named a member of the Public Utilities Commission of Connecticut to succeed Mr. Theodore B. Ford, Bridgeport. Mr. Elwell at present is engineer of the commission. Mr. Elwell was born in 1855, at Belfast, Me. He was educated in the public schools and at Patten academy was prepared for college. He entered the University of Maine, from which he was graduated in 1878, with the degree of civil engineer. Subsequently he was with the United States lighthouse engineering department for three years, in South Carolina, Georgia and Florida. He began railroading in 1882, with the old New York & New England railroad, now a part of the New York, New Haven & Hartford Railroad in the engineering

department. He was also in the employ of the Philadelphia & Reading Railroad for a short time previous to 1891, when he entered the employ of the Baltimore & Ohio Railroad. From 1891 to 1893 Mr. Elwell was engineer of maintenance of way for the latter road, and was stationed at Philadelphia and at Pittsburgh. In 1893 he entered the employ of the New York, New Haven & Hartford Railroad, and served three years as roadmaster, in charge of the New York division, constructing the "four tracks" between New York and New Haven. He was promoted to be superintendent of the Norwich & Worcester, the Air Line, Northampton and Shore Line divisions, in 1895, and he served the road in this capacity until 1908. At this time he was transferred to the electric lines as engineer of the Connecticut Company, and continued in that capacity until September, 1911, when the Public Utilities Commission was formed. The new commission chose Mr. Elwell as its chief engineer and inspector. His appointment as a commissioner has been confirmed.

Mr. H. L. Beach, whose appointment as manager of the Utah Light & Traction Company, Salt Lake City, Utah, was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 29, has had a well-rounded experience in railway operation. Mr. Beach is forty-five years of age. He entered electric railway work sixteen years ago as publicity manager of the Chicago (Ill.) Union Traction Company. Subsequently he was appointed assistant general superintendent of the north and west side lines and later was advanced to the position of general superintendent of the northern division of what is now known as the Chicago Railways. He resigned in 1912 and he became associated with Mr. Bion J. Arnold in connection with the appraisals of the electric railway properties in Toronto, Can., and Kansas City, Mo. Recently Mr. Beach served as traction expert with the Board of Supervising Engineers, Chicago Traction, which position he held until shortly before he was appointed manager of the Salt Lake City property.



H. L. BEACH

Mr. G. Tracy Rogers, who has retired as president of the Binghamton (N. Y.) Railway, embarked with some associates in the street railway business in Binghamton in 1889 and later bought the eight or nine other companies in Binghamton, built up the properties and organized the Binghamton Railway. He was instrumental in building the electric railway through Elmira to Corning and Painted Post, and that road with the Corning & Painted Post Railroad is now known as the Elmira, Corning & Waverly Railroad, with Mr. Rogers as president. Mr. Rogers also bought the property of the Waverly, Sayre & Athens Traction Company. He was one of the original directors and incorporators of the Hudson & Manhattan Railroad and consolidated some of the roads outside of Buffalo into the Buffalo Southern Railway and was connected with the syndicate which bought and owned the Port Jervis & Monticello Railroad. About 1905 Mr. Rogers and Mr. Leo H. Wise bought the property of the Rutland Street Railroad, the Peoples Gas Company and the Chittenden Power Company, Rutland, Vt., and consolidated the companies as the Rutland Railway, Light & Power Company. Later they purchased the Rutland Electric Light Company. Subsequently Mr. Rogers bought the property of the Fair Haven Electric Company and the Carvers Falls Power Company, and after operating the companies independently for a time he consolidated them with the Western Vermont Power Company, which, together with the Rutland Railway, Light & Power Company, was sold to the General Gas & Electric Company. Mr. Rogers was president of the Street Railway Association of New York State for nine years. The Binghamton Chamber of Commerce has adopted a resolution congratulating Mr. Rogers upon his accomplishments and expressing the desire that he continue his residence and activities in that city.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.**—Application for a charter has been made by this company to build a 49-mile electric railway from Ossipee to Durham, via Ossipee, Altamaha, Glencoe, Carolina, Hopedale, Burlington, Graham, Haw River, Swepsonville, Saxapahaw, River Falls and Chapel Hill. Incorporators: Junius Harden, John M. Cook, C. Brown Cox and D. M. Teague. Headquarters: Burlington.

Radford-Willis Southern Railway, Radford, Va.—Application for a charter has been made by this company in Virginia to build a 25-mile interurban railway from Radford to Willis. John L. Vaughan, Shawsville, president; E. F. Strong, Willis, vice-president; W. L. Castle, Willis, secretary, and A. L. McClung, Radford, treasurer. Headquarters: Radford. [E. R. J., Feb. 6, '15.]

FRANCHISES

San Jose, Cal.—The San Jose Railroad has asked the Council for a franchise on Alum Rock Road in San Jose. Sealed bids will be received by the Board of Supervisors until April 5 for said franchise.

Bristol, Conn.—The Bristol & Plainville Tramway Company has asked the Council for a franchise along the center of Park Street in Bristol.

Hartford, Conn.—The New Britain Street Railway has asked the Council for a franchise in Hartford. This is part of a plan to build an electric line between Hartford, New Britain, Plainville and Bristol. [E. R. J., Feb. 27, '15.]

New Britain, Conn.—The Connecticut Company has asked the Council for a franchise on Farmington Avenue, also through Stanley Quarter to Hartford, and through Osgood Avenue and North Burritt Street to Plainville.

St. Augustine, Fla.—The Jacksonville & St. Augustine Public Service Corporation has asked the Council for a franchise for an extension of time of one year on its franchise in St. Augustine. About 7 miles of grade has been completed south from South Jacksonville. [E. R. J., June 20, '14.]

Belleville, Ill.—The East St. Louis & Suburban Railway has received a franchise from the Council for a line on Rock Road, from the old city limits of Belleville to Edgemont.

Lancaster, N. Y.—The Buffalo & Depew Railway has asked the Council for a franchise to extend its lines from its present terminus, through Ellicott Road and Central Avenue to the New York Central Railroad tracks in Lancaster. The petition also asks for the right-of-way north on the Transit Road to extend a line north to Bowmansville.

Brantford, Ont.—The Brantford City Council has asked the Ontario Legislature to confirm a number of by-laws, among them being one for borrowing upon debentures $270,000 for the purchase, improvement and equipment of the Grand Valley Railway.

Brantford, Ont.—The Brantford & Hamilton Electric Railway has asked the Council for an extension of time on its franchise in which to build the branch from Langford to Galt, Ont.

Cornwall, Ont.—The Cornwall Street Railway, Light & Power Company has asked the Ontario Legislature for a twenty-year extension of time on its franchise in Cornwall.

Hamilton, Ont.—The Hamilton Mountain Electric Railway has applied to the Ontario Legislature for an extension of time to build the projected electric line from the Hamilton Mountain Road, Ancaster Township, at the crossing of the Brantford & Hamilton Electric Railway, to Mount Albion, Barton Township, and from the northerly boundary of Hamilton and Caledonia Road to Ryckman's Corners, 3 miles. T. H. Crerar, L. R. E. Awrey, S. B. Thompson, G. E. Armstrong and T. H. Stinson, Hamilton, Ont., are the provisional directors.

Richmond, Va.—The Virginia Railway & Power Com-

pany will ask the Council for a franchise for an extension of its line from its terminus at Oakwood Cemetery to Evergreen Cemetery in Richmond.

TRACK AND ROADWAY

Lacombe & Blindman Valley Electric Railway, Lacombe, Alta.—Grading is reported completed on this railway from Lacombe to Rimbey, 37 miles. Nothing has been decided as to when the track will be laid. J. C. Gibson, 56 King Street, West, Toronto, president. [E. R. J., Dec. 12, '14.]

Salt River Valley Electric Railway, Phoenix, Ariz.—Surveys have been completed by this company between Phoenix and Mesa, 18 miles, and between Scotsdale and Phoenix, 12 miles. The company's franchise for the line expired Dec. 21, 1914, and the project has been abandoned on account of financial conditions. C. C. Lewis, Phoenix, president. [E. R. J., Sept. 26, '14.]

Monterey & Pacific Grove Railway, Monterey, Cal.—An extension from Monterey to Fresno is being contemplated by this company.

Redwood City, Cal.—Plans are being contemplated to build an electric railway in Redwood City from the harbor site to the foothills via Redwood, Highlands and Wellesley Park. E. F. Fitzpatrick, Redwood City, is said to be interested. [E. R. J., May 16, '14.]

Connecticut Company, New Britain, Conn.—Arrangements are being made by this company to begin work as soon as the weather permits double-tracking its line on Chestnut Street, Stanley Street and Dwight Street in New Britain. Plans are also being made to lay new track and ties on its lines in Norwalk and vicinity in the spring.

Shore Line Electric Railway, Saybrooke, Conn.—An extension to Attawaugan and vicinity is being contemplated by this company.

Stafford & Monson Street Railway, Stafford Springs, Conn.—As soon as financial arrangements can be made this company will begin work on its 10-mile line between Stafford Springs and Monson. Robert H. Fisk, Stafford Springs, is interested. [E. R. J., Dec. 21, '13.]

Union Railway & Power Company, Chicago, Ill.—Preliminary arrangements are being made and most of the right-of-way has been secured by this company on the line to connect South Chicago and Harvey, Ill., and Hammond and Gary, Ind. Capital stock, authorized, $10,000. Capital stock, issued, $10,000. J. W. Paul, 161 Quincy Street, Chicago, general manager. [E. R. J., May 9, '14.]

Pekin & Petersburg Interurban Railway, Pekin, Ill.—Plans are being made to begin work at once on the reconstruction and extension of this company's lines in Pekin.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—This company advises that it is ready to construct the first division of its line from Peoria to Canton, a distance of 25 miles, and it is now in the market for ties, rails and equipment and would like to figure with grading outfits on the grading. Woolf Tritel, National Bank Building, Peoria, general manager. [E. R. J., Feb. 27, '15.]

Illinois Traction System, Peoria, Ill.—This company is building a spur track at Danville, extending from the main track through Ellsworth Park to the west end of the Mill Street bridge. The new spur will be used for transporting material to the proposed new bridge.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—Surveys are being made by the Allen Engineering Company on this 20-mile line to connect Peoria, Chillicothe, Mossville and Rome. Henry T. Mallen, Peoria, is among those interested. [E. R. J., Feb. 27, 15.]

Evansville, Chrisney & Eastern Railway, Evansville, Ind.—Construction of the proposed electric railway lines to connect Boonville and Chrisney and from Boonville to Lynnville is to begin inside of two months, according to an announcement made at the annual meeting of this company held in Evansville recently. Directors were elected as follows: J. P. Chrisney, Chrisney; T. P. Tillman and James A. Hemenway, Boonville, and J. E. Coe and G. Mulhausen, Evansville. Subsidies for the lines have already been voted. [E. R. J., Sept. 26, '14.]

Charles City (Ia.) Western Railroad.—Active work has been begun on the electrification of this railway. Orders have been placed for 26 miles of copper wire, 1200 poles and 22,000 ties. The extension of the railway, to be carried on at the same time, will be from Charles City in a northeast direction to the edge of the county in Niles Township, a distance of 8½ miles. This is the first step in its extension to Cresco. Bids have been sent to several contracting firms for grading, bridge and culvert work. E. R. Ernsberger, Charles City, general manager.

Worcester (Mass.) Consolidated Street Railway.—An expenditure of $75,000 is to be made in the spring by this company in relaying its tracks and placing the feed wires underground on Main Street in Worcester.

Libby (Mont.) Western Railway.—Preliminary arrangements are being made and it is expected that work will be begun about Aug. 1 on the construction of this proposed 398-mile electric railway to connect Missoula, Kalispell, Libby and Troy, Mont., and Bonners Ferry, Idaho, and Spokane, Wash. The power house will be at Kootenai Falls, Mont., and the repair shops will be located at Libby. Capital stock, authorized, $2,500,000. Capital stock, issued, $100,000. Bonds, authorized, $5,000,000. Bonds, issued, $1,000,000. It is planned to purchase power from the Kootenai Falls Electric & Power Company. Officers: Thomas A. McCanis, Libby, president; Amos L. Thompson, vice-president; P. M. Benard, Kalispell, secretary; Chester A. Adams, Libby, secretary; and Paul D. Pratt, Libby, Mont., treasurer. [E. R. J., March 6, '15.]

Buffalo & Depew Railway, Buffalo, N. Y.—This company has presented a petition to the Town Board of Lancaster asking permission to extend its lines through an additional street in Buffalo and has also asked for right-of-way to extend its line from Lancaster to Bowmansville. A public hearing will be held on March 22.

Brooklyn (N. Y.) Rapid Transit Company.—Pursuant to the direction of the Public Service Commission, First District, this company has obtained bids for supplying the steel for Section No. 2 of the third-tracking of the Broadway elevated railroad in Brooklyn, namely, from Myrtle Avenue to Aberdeen Street. These bids were submitted to the commission by the company, with the recommendation that the contract be awarded to Lewis F. Shoemaker & Company, the lowest bidders, whose price is $37.20 per ton. The total amount of the contract will be approximately $279,000. The commission, upon the advice of its chief engineer, has approved the award of the contract to Shoemaker & Company. The Public Service Commission for the First District has approved the award of the contract for the construction of the first section of the company's elevated extension on Jamaica Avenue from Crescent Street to Myrtle Avenue, to Post & McCord, who will complete the work in one year.

***Gowanda, N. Y.**—Interest in the proposed electric line from Jamestown to Buffalo is revived. Some time ago the rights-of-way from Falconer to Gowanda were mostly secured. Petitions for franchises for the towns of Poland, Ellington, Conewango, Leon, Dayton and Persia are now being prepared. The rights-of-way from Gowanda to Hamburg will be taken up as soon as the weather permits. It is the intention of those who have the matter in charge to hold meetings in the several towns from Gowanda to Buffalo as early as possible. The officers of the organization are J. B. Anderson, Ellington; R. G. Crandall, Kennedy; Franklin E. Bard, Gowanda; Frank N. Rowe, South Dayton; Clarence G. Mead.

Interborough Rapid Transit Company, New York, N. Y.—Installation of equipment for the operation of trains has been begun in the Steinway tunnel. From the Long Island City end high power cables were carried into the tube, and electricians are now at work putting them in place. These cables will carry the wires for lighting as well as for the operation of trains. The contractors are installing it at this time so as to get power for light to complete the laying of the tracks and the installation of the third-rail. The contractors said that the tunnel will be completed very near to contract time, which is about the middle of April, if nothing unforeseen occurs.

North Tonawanda, N. Y.—In accepting the franchise granted by North Tonawanda recently to the International Railway and the Frontier Electric Railway to build a fast service passenger line and fast service freight line, respectively, over the Buffalo, Thousand Islands & Portland right-of-way, from Niagara Falls to Buffalo, which those electric

railway companies are to share, announcement was made recently that work on both lines is to begin the coming spring. The officials stated that they hope to have the new roads in operation early next year. Under the terms of the North Tonawanda franchise both companies must have their lines completed and in operation by Dec. 31, 1916.

Cleveland, Alliance & Mahoning Valley Railway, Cleveland, Ohio.—The branch line between Warren and Newton Falls is nearly completed and plans are being made to place it in operation by April 1.

Cleveland (Ohio) Railway.—Plans are being made to extend the East Seventy-ninth Street line from Kinsman Road to the Pennsylvania Railroad tracks in Cleveland. Every mile of track which this company wants to relay this year in Cleveland will be inspected by the Street Railway Committee of the City Council. The company has asked for authority to relay 35,551 ft. of single track at a cost of $262,476 and to resurface 11,871 ft. of roadway at a cost of $38,019.

Hamilton (Ont.) Street Railway.—Plans are being made by this company to begin work early in the spring on the extension on Birch Avenue across Coal Oil Inlet in Hamilton; 10-ft. ties will be used.

London (Ont.) Street Railway.—During the year this company plans to build the following extensions in London: Hamilton Road—double tracking between Horton Street and Mamelon Street; double tracking between Rectory Street and Egerton Street; track extension from the present terminus at Egerton Street to East Street. High Street, South London—Traack extension from present terminus at McClary Avenue to Emery Street. Quebec Street—Dundas Street to Canadian Pacific Railway, new single-track line. Mount Pleasant Avenue, West London—New single-track line from Wharncliffe Road to Francis Street. Dundas Street—Double tracking from fair grounds to Ashland Avenue. H. A. Brazier, city engineer.

Ottawa (Ont.) Electric Railway. — An extension along Bronson Street in Ottawa is being contemplated by this company.

Toronto, Ont.—According to a statement made by Sir Adam Beck, work will be begun soon laying 98 miles of railway northeast of Toronto by the Hydro Electric Power Commission.

Toronto, Ont.—Bids will be received until March 16 for the supply of track material, overhead line material and oak ties required for the construction of the Lansdowne Avenue line in Toronto. Specifications may be obtained upon application at Room 12, purchasing and accounting section, of the Department of Work, City Hall, Toronto.

Westside Electric Street Railway, Charleroi, Pa.—The Mercantile Bridge Company over which this railway company operates, expects to install a wood block floor on its bridge located at West Monessen, Pa. This work will require approximately 5000 sq. yd. of creosoted wood blocks and 200,000 ft. creosoted lumber.

Wilkes-Barre & Hazleton Railway, Hazleton, Pa.—Plans are being contemplated by this company for an expenditure of about $600,000 for double-tracking its system.

McConnellsburg & Fort London Railway, McConnellsburg, Pa.—Preliminary arrangements are being made by this company to build its 10-mile line between McConnellsburg and Fort London. E. J. Post, McConnellsburg, president. [E. R. J., March 6, '15.]

Phoenixville, Valley Forge & Stafford Electric Railway, Phoenixville, Pa.—Steps are being taken by this company towards the completion of the railway to Stafford and also from Valley Forge to Bridgeport, while the line through Phoenixville will be continued to the Philadelphia and Reading stations.

Scranton & Binghamton Railroad, Scranton, Pa.—During the next four weeks this company expects to award contracts for new rails for 20 miles of new track between Nicholson and Montrose, Pa. Work has been completed by this company from Nicholson to within about 2 miles of Brooklyn, and it is planned to have this line completed to Montrose by the fall. This is part of the plan to build an electric line between Scranton and Binghamton.

Hull (Que.) Electric Company. — Citizens of Gatineau Point and of Hull are negotiating with this company to secure an extension of the company's line to Gatineau Point.

Charleston-Isle of Palms Railway, Charleston, S. C.—This company has been authorized to build an extension across the government reservation on Sullivan Island.

Johnson City, Tenn.—Representatives of this city and Jonesboro, which would be connected by a projected electric railway to be constructed at a cost of $80,000 between the two cities, met recently in the interests of the project. Mayor S. E. Miller, Johnson City, presided, and among those who attended were Mayor A. S. Murray, Jonesboro; R. M. May, J. H. Anderson, A. L. Shipley and J. S. Pritchett, all of Jonesboro. [E. R. J., Feb. 13, '15.]

Galveston (Tex.) Electric Company.—Improvements are soon to be made by this company on its Twenty-seventh Street and Thirty-seventh Street lines to the new baseball park in Galveston.

Virginia Railway & Power Company, Richmond, Va.—An extension to connect Petersburg and City Point is being considered.

Charleston (W. Va.) Interurban Railway.—This company expects to extend the Kanawha Valley Traction line as rapidly as possible to Montgomery, W. Va., 25 miles east of Charleston. This line is leased by the Charleston Interurban, which operates it. The line from South Charleston to St. Albans was built by the Charleston Traction Company, but was recently transferred to the Kanawha Valley Traction Company, William E. Chilton, president.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—Plans are being considered by this company to extend its line from Elkhorn to Delavan.

SHOPS AND BUILDINGS

Des Moines (Ia.) Street Railway.—This company has opened a new office in the Flynn Building in Des Moines.

Ohio Electric Railway, Cincinnati, Ohio. — This company has opened its new passenger station at Fort McKinley.

Ohio Valley Traction Company, Portsmouth, Ohio.—Plans are being contemplated by this company to build a new pressed brick passenger station at the corner of Waller and Ninth Streets in Portsmouth.

Brantford (Ont.) Municipal Railway. — On Feb. 13 this company received the approval of the commissioners in Brantford of plans for a new passenger station to be built on the site of the old power house on Colborne Street opposite Clarence Street, Brantford. Work is to be begun at once.

West Penn Traction Company, Pittsburgh, Pa.—This company has leased the fourth, fifth, sixth and part of the seventh floors of the Benedum-Trees Building in Fourth Avenue in Pittsburgh. This space will be used for offices, the company having decided to establish permanent headquarters for many departments in Pittsburgh.

Wellsburg, Bethany & Washington Street Railway, Bethany, W. Va.—This company has just completed its new carhouse and repair shop at Bethany.

POWER HOUSES AND SUBSTATIONS

San Joaquin Light & Power Company, San Joaquin, Cal.—It is reported that this company, which recently completed an electric power generating plant at The Forks above Springville, will soon begin to build a canal from a point on the Camp Nelson branch of the Tule River 9 miles above the power house, the purpose of the second canal being to furnish more water for the power house. It is said that the present waterfall at the power house creates 3000 hp, whereas the equipment there is capable of generating much more. The canal, if it is built, will necessitate 2 miles of tunneling, the longest tunnel to be 900 ft.

Northern Pacific Railway, St. Paul, Minn.—This company has purchased four 25-kw, 3500 r.p.m., 125-volt Curtis turbo-generator sets with switchboard and accessories from the General Electric Company.

United Traction Company, Albany, N. Y.—This company will add to its substation equipment a 1200-kw synchronous converter and three 440-kv-a. transformers which have been ordered from the General Electric Company.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company will install a 500-kw synchronous converter with 550-kv-a. transformer and switchboard which will be furnished by the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Cleveland (Ohio) Railway has ordered fifty front-entrance, center-exit, semi-steel cars from the G. C. Kuhlman Car Company.

Lehigh Traction Company, Hazleton, Pa., has sent out specifications, through L. B. Stillwell, for ten all-steel center-entrance city cars.

Third Avenue Railway, New York, N. Y., advises that it is not expecting to purchase new cars for its subsidiary, the Yonkers Railroad, as previously reported.

New York State Railways, Rochester, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 6 as having issued specifications for forty prepayment, center-entrance cars, has withdrawn its request for bids on these cars and is now asking for bids on one sample car.

Binghamton (N. Y.) Railway has ordered fifty city cars from the Cincinnati Car Company through W. R. Kerschner, its eastern agent. Twenty of these cars, the order for which was reported in the ELECTRIC RAILWAY JOURNAL of March 6, are to be delivered at an early date, fifteen cars about the beginning of next year and the remaining fifteen at a still later date.

Chicago (Ill.) Surface Lines have been ordered by the Chicago City Council to purchase 336 cars in accordance with the terms of their contract with the city, before February, 1916. This order requires an immediate contract for the delivery of 168 cars with an additional contract for fourteen cars each month until the close of the fiscal year, February, 1916.

TRADE NOTES

Esterline Company, Indianapolis, Ind., has received an order from the United Railways of St. Louis for 100 SM-95 "Golden Glow" headlights. This order was secured by F. O. Grayson, of the Grayson Railway Supply Company, St. Louis, Mo., agent.

Hess-Bright Manufacturing Company, Philadelphia, Pa., advises that notwithstanding the reported obstacles to the importation of its ball bearings, it continues to receive great quantities from its Berlin works, the total since Sept. 15, 1914, being 375,000 bearings of assorted sizes.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order for electrical equipment for the cars recently ordered by the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., from the Cincinnati Car Company. The equipment includes four complete, four-motor equipments, with HL control. At the same time a contract was let for four HL control equipments to replace the automatic control on four cars. When the new equipment is installed the company will then have eight cars with HL control and twelve with automatic equipment.

Railway Improvement Company, New York, N. Y., held its annual meeting on March 1, and a number of changes were made in its organization. United States Congressman George W. Fairchild, of Oneonta, N. Y., was elected president to succeed Frank Hedley. John Starets was elected treasurer to succeed J. S. Doyle. T. Channing Moore, New York manager of the International Time Recording Company, was elected director in place of Mr. Hedley, and John Starets was elected director in place of Mr. Doyle. Congressman Fairchild is president of the International Time Recording Company and chairman of the board of directors of the Computing-Tabulating-Recording Company. The changes mentioned are due to the fact that the stock holdings of Messrs. Hedley and Doyle have been purchased by Messrs. Fairchild, Pizzini and Moore. This change makes the Railway Improvement Company more closely affiliated with the Computing-Tabulating-Recording Company and the International Time Recording Company, Endicott, N. Y. The latter company has always built the recorders of the Railway Improvement Company.

ADVERTISING LITERATURE

Bridgeport Brass Company, Bridgeport, Conn., has issued a folder on its "phono-electric" trolley wire.

A. O. Schoonmaker Company, New York, N. Y., has issued a price catalog of its India and amber stamped solid sheet mica segments and mica rings for railway motors.

Blaisdell Machinery Company, Bradford, Pa., has issued an unusually comprehensive catalog describing and containing data on its compressed-air machinery which is especially applicable to the operation of pneumatic tools and drills as used in machine shops.

Gas-Electric Motor Bus Corporation, New York, N. Y., has issued a catalog describing and illustrating its gas-electric stepless motor buses. As shown in the catalog, these buses are made both double deck with two-man operation and single deck, with one-man operation.

Nelsonville Brick Company, Nelsonville, Ohio, has issued a catalog describing its filler stretcher brick for use in paving next to car track rails. The catalog states that this company has shipped 639 miles of this brick for this use, and that in the last five years they have been used in eighty-nine cities, eleven states and in Canada. The catalog contains testimonial letters from the Cincinnati Traction Company, Pennsylvania & Ohio Railway and City Railway, Dayton, Ohio.

Walpole Tire & Rubber Company, Walpole, Mass., has issued a catalog describing its friction tape, insulating compounds, and molded rubber goods of every description. This company recommends its Armalac compound especially for the use of street railway armatures. This material is a neutral permanently plastic insulating compound for reinforcing the insulation for cotton covering of electrical conductors. Its constituents are paraffin wax, the melting point of which is raised permanently by a certain process, and petroleum naphtha. The paraffin base is said to insure permanency of insulation and resistance to moisture under the repeated heating and cooling of the windings in service. Armalac is made especially for street railway use for d.c. equipment, also for a.c. equipment where the pressure is 550 volts or under. It is neither alkaline nor acidulous, and therefore cannot attack copper wire.

Combustion Engineering Corporation, New York, N. Y., has issued a catalog describing and illustrating its Type E stoker. This stoker is of the underfeed type, the coal being fed into the furnace from beneath the fire in such a manner as to effect the distillation of the volatile matter from the coal and insure the complete combustion of the gases which are driven off. The coal is fed by hand labor or coal-conveying machinery into a large hopper and conveyed under the fire by means of the reciprocating sliding bottom of the feed trough which runs the full length of the stoker. The coal is delivered uniformly from truck to rear by the auxiliary pushers, and as it rises in the trough is distributed to the sides of the furnace by means of the moving bars. The burning fuel is constantly carried by the action of these bars to dumping trays along each sidewalk where the resulting ash or clinker is deposited. These trays are dumped by a single motion of the dump lever on the outside of the furnace. As stated in the catalog, these stokers are in use throughout Europe, South America and the United States, burning coking or non-coking coal ranging from 10 per cent to 40 per cent volatile matter and 5 per cent to 30 per cent ash. The catalog contains several illustrations of installations of this stoker under various types of boilers.

NEW PUBLICATION

Central Electric Railway Accountants' Association Pamphlet. 1915. Sixty-six pages. Paper-bound.

This pamphlet of the Central Electric Railway Accountants' Association, issued under date of January, 1915, contains a list of present and past officers, the names of the members of the association, its constitution and by-laws and an index to papers and committee reports published in pamphlets previously issued. A synopsis is presented of the decisions and recommendations of the association in regard to handling interline accounts for both freight and passenger traffic, and reproductions of the standard forms to be used are included. The pamphlet also contains the following papers: "Compiling Operating Expenses," by E. L. Kasemeier; "Some Accounting Problems Not Electric," by W. B. Wright; the presidential address of L. T. Hixson at Dayton, 1914; "Cost Accounting in a Manufacturing Plant," by G. D. Piper, and several citations used by W. H. Forse, Jr., on the subject of depreciation at the Dayton meeting.

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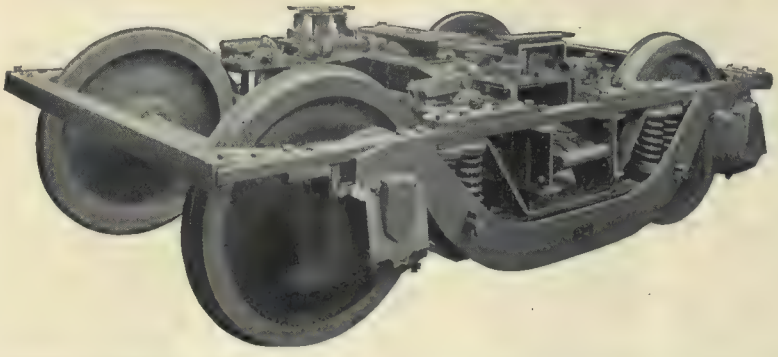
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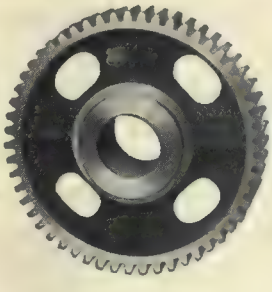
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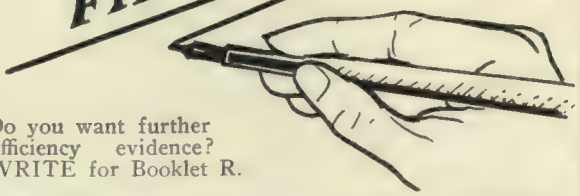
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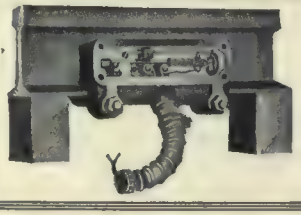
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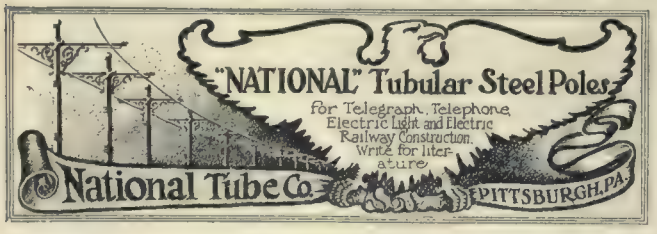
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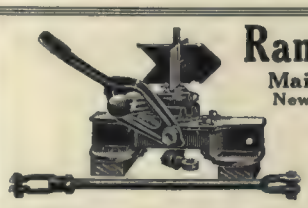
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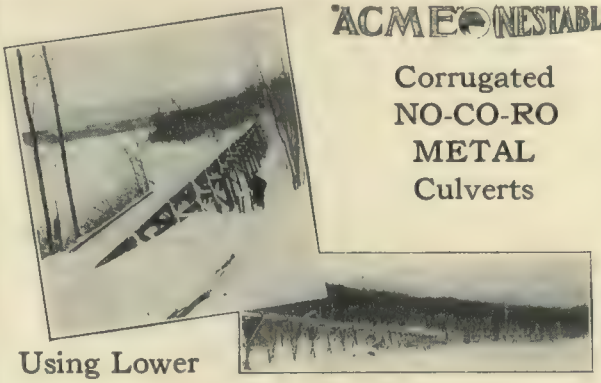
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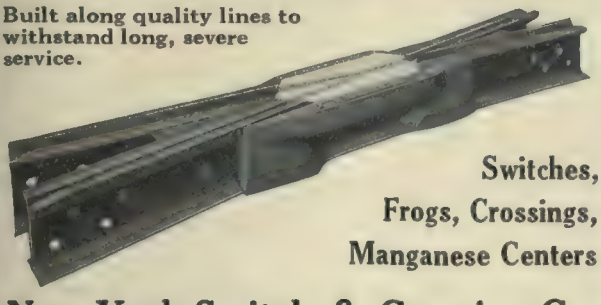
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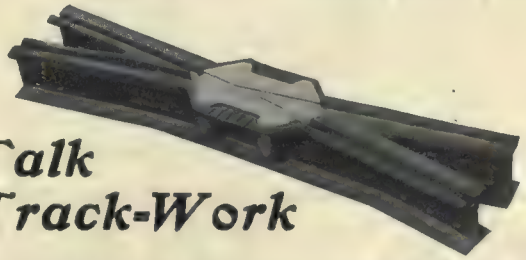
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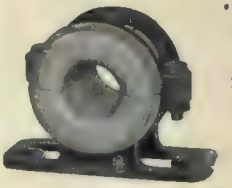
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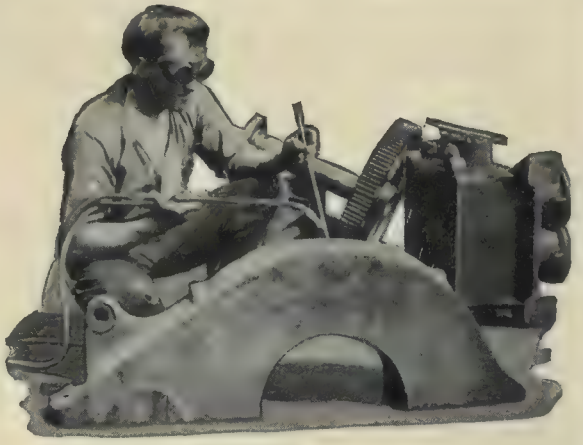
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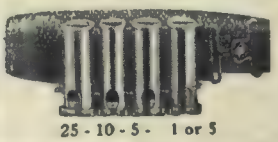
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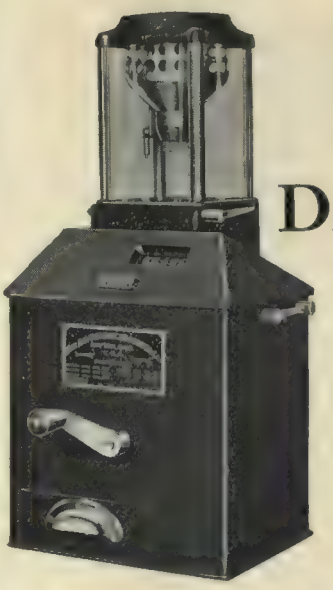
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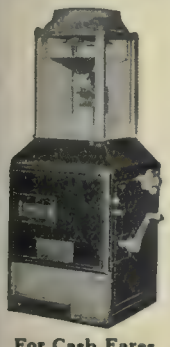
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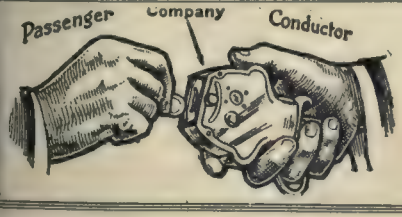
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WASSON ENGINEERING & SUPPLY CO.
MILWAUKEE, WISCONSIN

SEARCHLIGHT SECTION

FOR SALE

10—42′ Kuhlman Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
30—Brill 20′ Closed Cars, G.E. 1000 Motors, Brill 21-E Trucks.
2—Jackson and Sharp 18′ Bar Bodies.
20—Jones 20′ Closed Cars, G.E. 52 Motors, Bemis Trucks.
10—Wason 10 Bench Open Cars, G.E. 1000 Motors, Bemis Trucks.
5—Brill 10 Bench Open Cars, West. 12A Motors, Brill 21E Trucks.
8—Brill 14 Bench Open Cars, West. 56 Motors, Brill 22-E Trucks.
4—Brill 30′ Express Cars, Brill 22-E Trucks.
9—Brill 30′ Express Cars complete, 4 G.E. 1000 motors, AA-1 Air Brakes, Brill 27-G Trucks.
8—Brill 22′ Closed Cars, West. 68 Motors, Peckham Trucks.
1—Jackson and Sharp 20′ Car Body.
20—G.E. 80 Railway Motors complete.
12—G.E. 54 Railway Motors complete.
60—G.E. 1000 Railway Motors complete.
60—G.E. 800 Railway Motors complete.
40—West. 12A Railway Motors complete.
32—West. 49 Railway Motors complete.
8—West. 38B Railway Motors complete.
10—West. 112 Railway Motors complete.
4—West. 68-C Railway Motors complete.
4—West. 68 Railway Motors complete.
12—G.E. 73 Railway Motors complete.
24—G.E. 87 Railway Motors complete.
20—G.E. 57 Railway Motors complete.
3—West. 101-B2 Armatures, brand new.
3—West. 93-A2 Armatures, brand new.
3—West. 93A Armatures, brand new.
22—G.E. 80 Armatures, brand new.
2—G.E. 87 Armatures, brand new.
2—G.E. 73-C Armatures, brand new.
4—G.E. 67 Armatures, brand new.
18—G.E. 57 Armatures (second-hand), two turn.
30—G.E. 57 Form A Motor Casings.
22—K6 Controllers.
44—K11 Controllers.
28—K2 Controllers.
62—K10 Controllers.
30—K14 Controllers.
28—B29 Controllers.
2—Sets Brill 27G Trucks, 4′ 6″ wheel base.
6—Brill 21E Trucks, 7′ 6″ and 8′ wheel base.
10—Dupont Trucks, 7′ 6″ wheel base.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

W. R. KERSCHNER CO., Inc., 50 Church Street, NEW YORK, N. Y.

MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC, with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.

2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

An Unusual Bargain

One double truck, single track snow plow, length over all 40 ft., width 8′6″, height 10′9″, truck centers 13′8″. wheel base 4′. Plows raised and lowered by hand or compressed air.

Equipped with two K-14 controllers, rheostats and cable, one main reservoir, brake cylinder and brake valves, air cylinders and valves for operating plows.

Price $1,000, F.O.B. Rensselaer, New York.

Albany Southern R. R. Co.

Rensselaer, N. Y.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

THE MOST SUCCESSFUL MEN IN THE ELECTRIC RAILWAY INDUSTRY READ THE ELECTRIC RAILWAY JOURNAL EVERY WEEK

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

Get your Wants into the Searchlight

SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M. Also following transformers:
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

8—**75 H.P. Westinghouse, 112 Railway Motors,** 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—**G.E. 57 Motors,** 50 H.P. Each.
16—**G.E. 67 Motors,** 40 H.P. Each.
20—**G.E. 201 Motors,** 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt. 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

ARCHER & BALDWIN, 114 Liberty Street ROOM 302 'Phone Rector 4337-4338 **New York**

SEND FOR CATALOG—JUST OUT
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

FOR SALE: WANTED FOR CASH

Cars, Motors, Rails, Generators—Everything for Track, Rolling Stock, Power Plant. Send us your requirements.

Ask for our **FOR SALE LISTS** also Blue List **RPECO** Specialties

Railway & Power Equipment Co.
(Charles F. Johnson)
Established 1901
P. O. Box 155, Ellicott Square
Buffalo, N. Y.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

CLAIM attorney, desiring change, is open for engagement with electric railway company, where the services of a practical and competent claim adjuster are needed. Have 10 years' active experience in street and interurban railway work, in transportation, construction and claim departments. High class references furnished. Address Box 701, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

EXPERIENCED man open for engagement as general superintendent or master mechanic; many years' experience all branches; A1 references. Box 700, Elec. Ry. Jour.

HIGH grade man desires position as secretary or assistant to busy executive. Fully experienced and thoroughly trained in management of various departments. At present operating official of system of city and interurban lines. Age 35, health good and am willing to go anywhere. Address Box 694, Elec. Ry. Jour.

POSITION wanted by line foreman, on construction or maintenance. Experienced on heavy catenary and trolley construction. Married, sober and good references. Box 703, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

POSITION wanted as engineer or superintendent. Age 35, single, college education; 10 years' experience on construction, maintenance, rehabilitation and valuation of electric railways. Box 710, Elec. Ry. Jour.

STREET railway superintendent with twenty years' experience desires to make change. Thoroughly acquainted with all branches of the work. Box 702, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page,	$5.00	1 in. single col.,	$3.00
1-8 page,	10.00	4 in. single col.,	11.60
1-4 page,	20.00	8 in. single col.,	22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

SUPERINTENDENT of equipment or master mechanic, open for position; 22 years experience installing, maintaining and rebuilding; up-to-date shop manager. Box 704, Elec. Ry. Jour.

WANTED—By a thoroughly up-to-date, reliable and competent man, 40 years of age, experienced in all branches of railway operation and maintenance, position as superintendent or superintendent of equipment. Best of references, past and present. Correspondence solicited concerning any good opening. Box 697, Elec. Ry. Jour.

WANTED—Position as superintendent of track and way, or roadmaster by a man, age 37 years, with 23 years' practical experience in all branches of street and interurban railway construction and maintenance work. At present employed as roadmaster by large eastern property. Desired change not compulsory. Box 707, Elec. Ry. Jour.

MISCELLANEOUS

Rotary Converters Wanted

WANTED—Two 500 K.W. 60 cycle, 6 phase shunt wound Rotary Converters, must be in first-class condition. Give full data regarding length of time run, point of inspection, etc. Box 705, Elec. Ry. Jour.

FOR SALE

BIG BARGAIN

70 lb. A. S. C. E. Switch Material.
25 No. 10—15 ft. Double Spring Frogs, Wing Rails Reinforced.
25—15 ft. Split Switches, Reinforced; were never used.
Don't overlook this.

ZELNICKER — WALTER A. ZELNICKER SUPPLY COMPANY — in St. Louis

TELL US WHAT YOU NEED

FOR SALE

AT BARGAIN PRICES—One 120 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 200 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 300 KW, General Electric, 133 Cycle Single Phase Alternator. Address "H. F. W., Jr.," 309 Colby-Abbot Bldg., Milwaukee, Wis.

The Classified Advertising in Electric Railway Journal

is read carefully by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand dinky engine at a moderate price, an expert draftsman or superintendent, or the services of a firm of engineers for designing a large modern plant.

The Best Proof

of this is the regularity with which such advertisements are carried—the extent and variety of the JOURNAL'S want ads. Without a constant and appreciable *demand* for such machinery or services, by the JOURNAL readers, the market-place which these advertisements represent could not exist for any length of time.

Electric Railway Journal
239 West 39th St. New York City

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Service.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Alloys, Steel & Iron.
Titanium Alloy Mfg. Co.

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Architects.
Kennard, Ralph B.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co.
Western Electric Co.

Bankers and Brokers.
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Protective Signal Mfg. Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Protective Signal Mfg. Co.
Reiter, G. C.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Blow Torches for Soldering and Brazing.
Prest-O-Lite Co., Inc., The.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Imp. Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Western Electric Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jéandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.
Wasson Engrg. & Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Chas. F. Etter.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plow Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co.
Johnson Fare Box Co.

Commutator Slotters.
American General Engrg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
American General Engrg. Co.
General Electric Co.
Western Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co., Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.



Get after Brush Costs

Not initial cost, but the complete cost of brushes for 1914

—then let me state what Le Carbone Brushes would have saved.

W. J. Jeandron
173 Fulton St.
New York

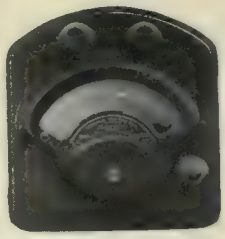
The Highest Development

In Very Small Indicating Instruments for Direct Current

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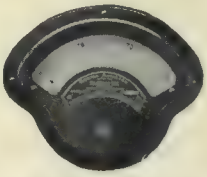
Weston

Miniature Precision Instruments



MODEL 280, Single Range Portable Voltmeter
(One-quarter Size.)

PORTABLE
Volt-Meters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
are supplied in single, double and triple ranges, the Triple Range Volt-Ammeter comprising six instruments in one. This group also includes BATTERY TESTERS.



MODEL 267, Switchboard Ammeter.
(One-quarter Size.)

SWITCHBOARD
Voltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.
They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate, dead beat and extremely sensitive.
They may be left continuously in circuit at full load and are shielded against external electrical and magnetic influences.
They are substantially constructed and have the longest scale ever provided in instruments of similar size.
The prices are surprisingly low for instruments of such quality.
The several models and ranges offer a selection from over 300 different combinations. They are listed in BULLETIN NO. 8, WHICH WILL BE MAILED UPON REQUEST.

Weston Electrical Instrument Co., Newark, N. J.

New York, Chicago, Philadelphia, Boston, St. Louis, Denver, San Francisco, Detroit, Cleveland, Buffalo, Atlanta, Richmond, Toronto, Montreal, Winnipeg, Vancouver, Berlin, London

MORGANITE
Brushes

TRADE MARK

Prescribed—not merely sold.

The Morgan Crucible Co., Ltd.
120 Liberty St., New York
Factory Brooklyn

There are 205 Storage Battery Street Cars now in operation in New York City. 174 of these Storage Battery Cars are Equipped with "Hycap-Exide" Batteries

THE ELECTRIC STORAGE BATTERY CO.

New York, Boston, Chicago, St. Louis, **PHILADELPHIA, PA. 1888-1915**, Detroit, Denver, Los Angeles, San Francisco, Pittsburgh, Cleveland, Atlanta, Washington, Seattle, Toronto

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W:
Western Electric Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplpies Co.
Garton Co., W. R.
Imperial Rubber Co.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co., The.
Railway Supply & Curtain Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Cutting Processes.
Prest-O-Lite Co., Inc., The.

Derailing Devices.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.
Western Electric Co.

Detective Service.
Wisch Service, P. Edward.

Disinfectants.
Gardner & Co.

Door Operating Devices.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Herrick, Albert B.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Kennard, Ralph B.
Richey, Albert S.
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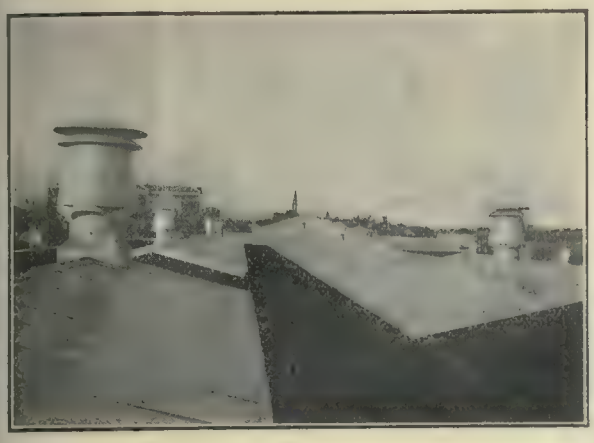
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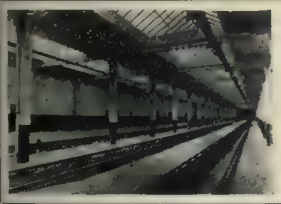
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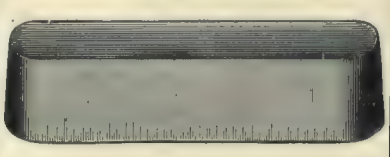
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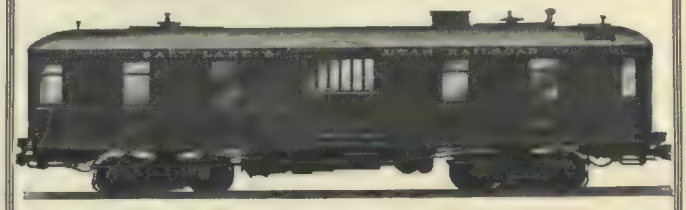
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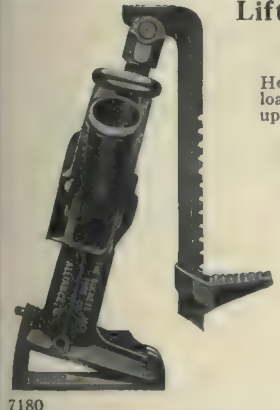




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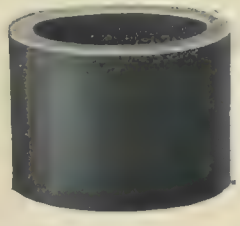
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Imperial Rubber Co.

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General Electric Co.
Johns-Manville Co., H. W.
Long Co., E. G.
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Universal Trolley Wheel Co.

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Wires and Cables.
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Garton Co., W. R.
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Kerite Insulated Wire & Cable Co.
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Westinghouse Elec. & M. Co.

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ALPHABETICAL INDEX TO ADVERTISEMENTS

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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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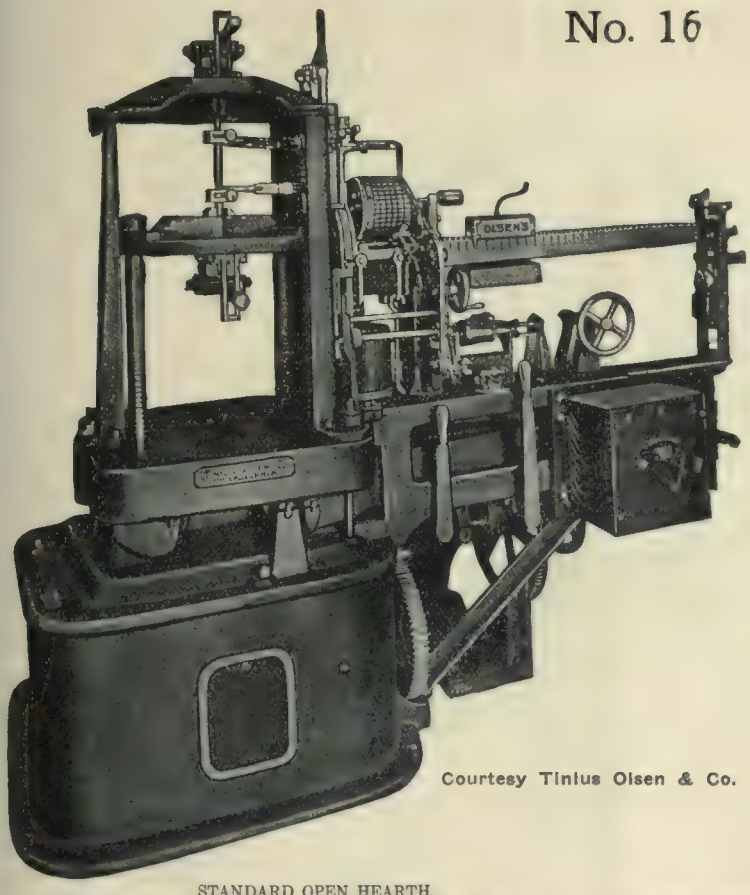
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TITANIUM IN RAIL STEEL

No. 16



Courtesy Tinius Olsen & Co.

Results of Tensile Tests

Results in 17 samples Standard and 17 of Titanium-Treated Open-Hearth A-Rails.

STANDARD OPEN HEARTH

Elastic Limit		Ultimate Strength		Per Cent. Elongation		Per Cent. Reduction	
Head	Flange	Head	Flange	Head	Flange	Head	Flange
60,200	58,600	122,700	121,700	9.5	9.8	8.9	9.5
56,100	57,100	122,100	120,500	8.5	11.5	8.5	12.7
62,600	60,200	115,700	127,500	4.0	10.0	3.1	10.2
53,100	53,200	116,200	116,500	14.0	16.8	15.3	19.0
57,200	60,500	120,900	131,900	4.5	11.5	4.1	12.8
56,100	58,200	123,800	126,500	13.7	14.5	14.6	18.7
57,700	53,200	118,600	115,600	10.7	16.5	10.9	19.6
61,000	59,000	125,600	126,400	15.8	16.3	20.0	20.2
60,600	62,100	124,900	126,700	15.8	16.5	19.2	21.1
55,600	55,100	119,800	120,100	16.5	17.0	17.5	19.0
51,700	52,400	117,700	116,000	18.0	19.0	20.1	25.7
55,000	54,000	119,100	119,000	18.0	18.0	22.0	22.4
63,100	67,900	129,900	134,400	9.5	13.0	9.8	15.6
71,500	70,900	141,400	144,200	7.5	9.5	7.5	10.5
59,700	58,500	121,800	121,400	14.3	16.8	16.2	22.7
44,000	43,900	98,700	98,000	22.3	24.0	26.9	30.4
42,700	44,300	99,400	99,500	16.8	19.8	18.9	23.9
56,936	**57,005**	**119,900**	**121,523**	**12.9**	**15.3**	**14.3**	**18.4**

TITANIUM-TREATED OPEN HEARTH

Elastic Limit		Ultimate Strength		Per Cent. Elongation		Per Cent. Reduction	
Head	Flange	Head	Flange	Head	Flange	Head	Flange
58,400	57,200	121,000	122,100	14.3	13.8	15.7	17.6
58,700	59,600	125,000	128,900	9.5	10.8	10.1	12.3
58,300	60,500	127,100	127,400	13.0	15.0	16.9	19.9
53,300	56,500	115,800	118,100	13.3	14.3	15.9	18.7
56,300	59,700	124,500	126,800	13.0	13.5	16.2	17.5
52,900	54,600	113,900	114,800	13.5	17.2	13.8	23.0
63,200	64,800	130,300	130,000	12.7	15.5	14.5	19.2
59,300	56,200	128,200	128,600	16.8	18.0	22.2	22.6
57,900	57,900	120,700	124,600	18.8	18.5	25.9	26.0
58,100	57,600	125,700	126,000	16.8	17.7	20.3	23.7
63,300	63,100	133,500	129,800	13.5	16.0	16.3	21.5
57,800	57,600	124,000	125,400	15.0	16.0	17.8	20.4
64,100	65,200	132,600	134,900	12.0	13.0	13.3	15.0
69,400	72,500	140,900	142,800	11.5	12.3	12.8	15.5
60,100	56,100	125,500	118,500	11.8	16.3	11.7	19.5
57,500	56,700	122,000	122,600	11.5	14.0	12.6	16.3
61,900	61,500	126,600	127,000	14.0	14.8	16.9	19.3
59,441	**59,841**	**125,723**	**126,370**	**13.5**	**15.1**	**16.0**	**19.2**

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New York, March 20, 1915

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Chicago Elevated Shop Practice 651

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ELECTRIC RAILWAY JOURNAL, March 20, 1915. 10 cols. Ill.

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ELECTRIC RAILWAY JOURNAL, March 20, 1915. 10 cols. Ill.

Signal Maintenance Methods 561

On the New York, Westchester & Boston Railway ten men maintain four interlocking plants and 110 semaphore signals at an efficiency of 99.995 per cent.

ELECTRIC RAILWAY JOURNAL, March 20, 1915. 10 cols. Ill.

Steel Cars on the Long Island 566

Ten years' experience with all-steel construction has shown that deterioration is practically negligible and that routine repairs are minor in character.

ELECTRIC RAILWAY JOURNAL, March 20, 1915. 8½ cols. Ill.

Coasting Recorders in New York 572

The number of kilowatt-hours required for standard cars on the Third Avenue Railway has been reduced for one month as much as 10 per cent. Accidents also show big decrease.

ELECTRIC RAILWAY JOURNAL, March 20, 1915. 8 cols. Ill.

Manganese Steel Special Work 577

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ELECTRIC RAILWAY JOURNAL, March 20, 1915. 5¼ cols.

Electrification Discussed 579

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Painting Cars in Two Days 584

P. V. See, superintendent of car equipment Hudson & Manhattan Railroad, explains how that railroad has extended the use of baking enamel to exterior painting by developing a portable oven.

ELECTRIC RAILWAY JOURNAL, March 20, 1915. 5½ cols. Ill.

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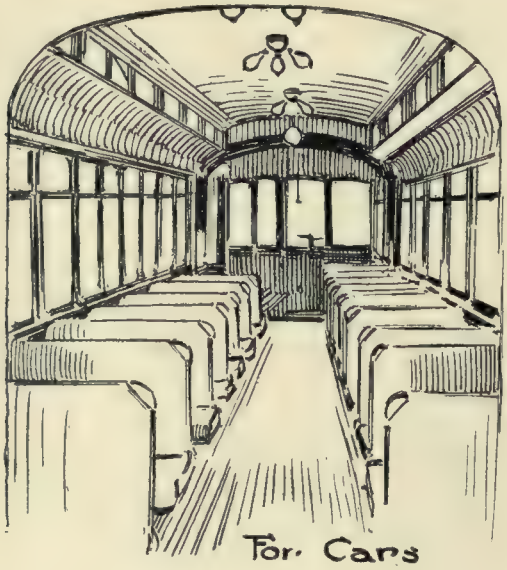
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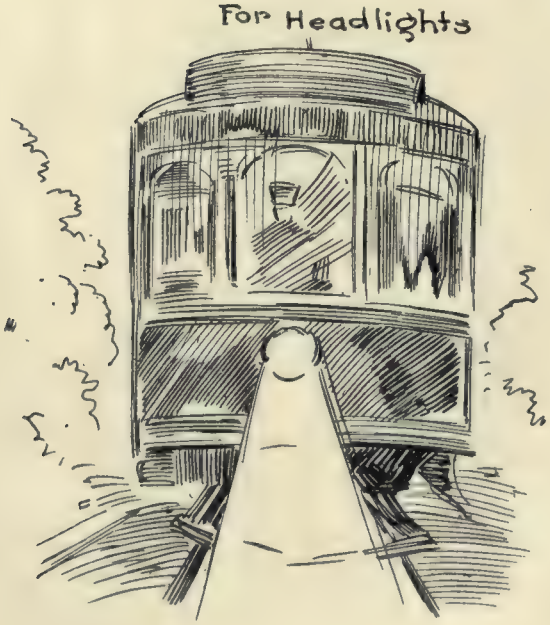
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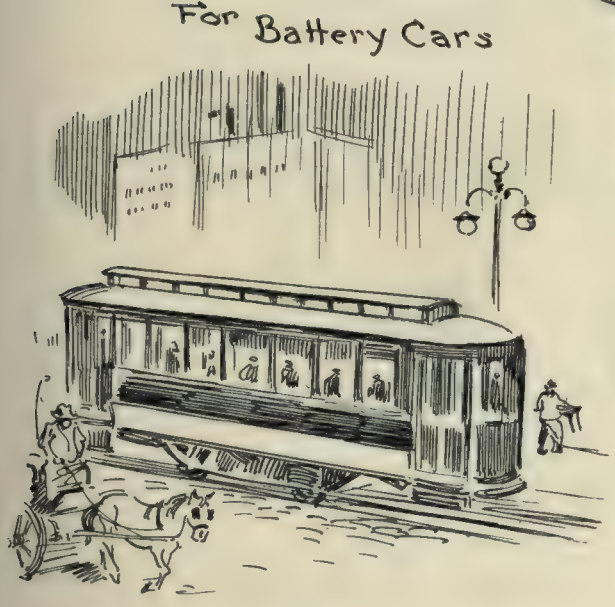
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Boston	Dallas	New Orleans	Salt Lake City
Buffalo	Denver	New York	San Francisco
Butte	Detroit	Philadelphia	Seattle
Chicago	Kansas City	Pittsburgh	Syracuse

Export Sales Department—165 Broadway, New York.

Member Society for Electrical Development. "Do it Electrically."

Westinghouse Lamp Co.,
1261 Broadway, New York.

Please send a copy of lamp data book to

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Department.....

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.....

INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building



5

In order to render good service, electric railways must be allowed to earn a fair return on a fair capitalization.

—From Code of Principles Adopted by A. E. R. A.

The returns on an investment can frequently be considerably increased by very slightly increasing the investment.

For example, the additional investment required to make an ordinary car into a

Prepayment Car

amounts to approximately 2%. Yet the advantages gained by this slight increment result in increased receipts which frequently return this investment ten times over within every year of the car's life—actually repay the **entire** investment in the car four times during the life of the car.

Progressive roads everywhere have shown that they appreciate the fact that our pioneer work and our continuous study of car engineering represented by the Prepayment patents enable us to render a distinct service—and that the investment required to apply our ideas is insignificant as compared with the returns which such applications insure.

PREPAYMENT CAR SALES COMPANY



The Electric Railway Journal at the Panama-Pacific Exposition

FOR the convenience of its friends, the McGraw Publishing Company, Inc., publishers of the Electric Railway Journal, Electrical World, Engineering Record and Metallurgical & Chemical Engineering have equipped a booth in the Palace of Machinery.

A cordial invitation is extended to all who are interested in the electric railway field to avail themselves fully of this space while visiting the Exposition.

It will be a pleasure to receive and care for visitors' mail addressed in care of the McGraw Publishing Company booth.

Competent stenographers are in attendance to handle correspondence.

Representatives in charge of the booth will be glad to give information regarding engineering work in the West.

The publishers' San Francisco office, Rialto Building, in fact, is headquarters for technical information about the West, for editorial and business representatives there travel up and down the coast regularly so as to keep readers of the McGraw Publications in intimate touch with conditions.

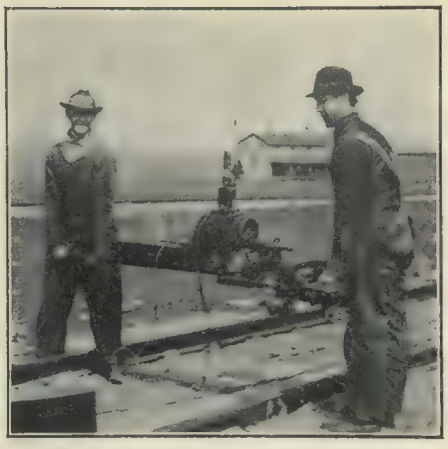
Use the McGraw Booth as your office while you are at the fair.

[PUBLISHER'S PAGE]





The Machine in Operation. Pat. applied for.



No Trouble to Remove from Track.

The Low Cost of Bonding With O-B Type J Bonds

is due largely to the electrically operated O-B Milling machine used for milling holes in the ball of the rail.

Two men operate the machine and remove it from the track easily when necessary. A third man installs the bonds.

Records of installations on different roads show that three men can be expected to bond more than 100 joints per day, even under severe conditions. The total cost of installing is remarkably low.

Let us give more detailed figures.

THE OHIO BRASS COMPANY

Mansfield, Ohio

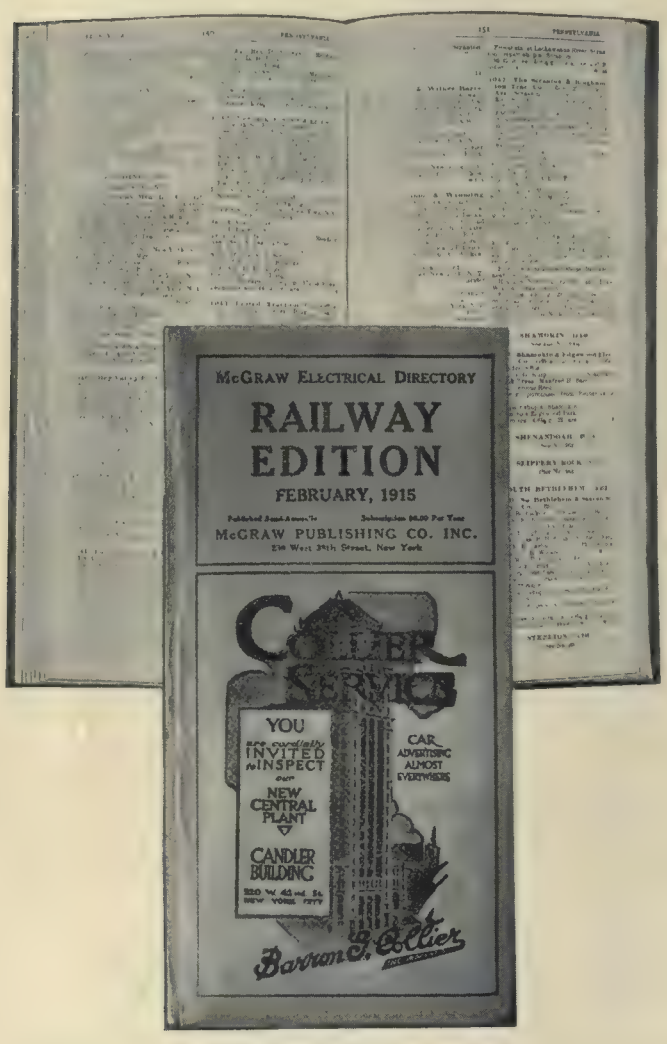


Section of Terminal Installed in Rail.



O-B Type J Bond Installed -Patented.

A Big Help in Selling to Electric Railways



Who's the man to see on that road?
The McGraw Electrical Directory tells.

What's that man's title?
The McGraw Electrical Directory tells.

Who's the Superintendent?
The McGraw Electrical Directory tells.

Who's the General Manager?
The McGraw Electrical Directory tells.

What kind of current does it use?
The McGraw Electrical Directory tells.

What's its generating equipment?
The McGraw Electrical Directory tells.

What make and type of boilers?
The McGraw Electrical Directory tells.

How many miles of track has it?
The McGraw Electrical Directory tells.

How many cars, what type, etc.?
The McGraw Electrical Directory tells.

Where are its shops located?
The McGraw Electrical Directory tells.

Where are its power stations and sub-stations located?
The McGraw Electrical Directory tells.

Does it furnish lighting current?
The McGraw Electrical Directory tells.

Does it operate an amusement park?
The McGraw Electrical Directory tells.

What roads does it control?
The McGraw Electrical Directory tells.

What are the names of the roads at Indianapolis?
The McGraw Electrical Directory tells.

What does this book cost?
Five dollars a year.

How often is it published?
Twice a year. A new one has just been issued.

How will it help our sales work?
Write for a copy on approval and see for yourself.

Who publishes it?
McGraw Publishing Company, Inc.

What's their address?
239 West 39th Street, New York.

What shall we do about it?
Write for your copy on approval TO-DAY.

SKEE-BALL

For Big Park Profits This Summer

Skee-Ball is the ideal amusement for parks and popular resorts. Its interest is permanent. From the beginning to the end of the season the crowds continue to play. It appeals to both men and women and furnishes enjoyment from the start, which increases as skill is attained by practice.



FINALS OF A TOURNAMENT ON CHIEF BENDER'S ALLEYS

The great Indian pitcher is seen sitting on the middle of the center alley. The Chief is a Skee-Ball expert as well as an enthusiast.

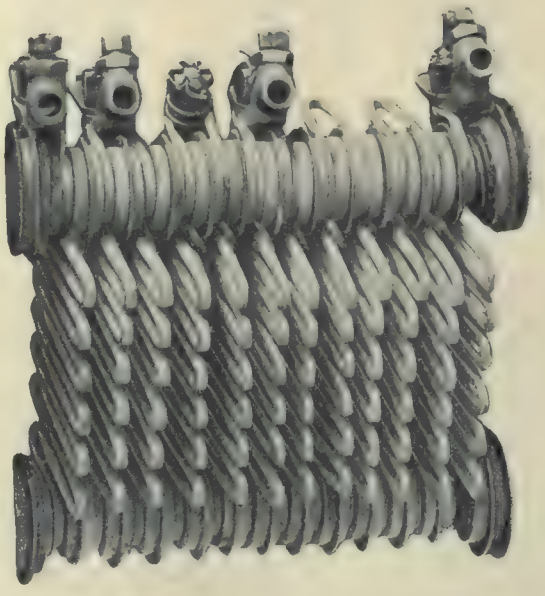
SKEE-BALL as a money-maker is in a class by itself. Throngs are invariably attracted and seem unable to leave after they start to play. The Automatic Slot Machine and the Automatic Scoring Device reduce the cost of operation to a minimum.

Order Now for Early Delivery. Write for Booklet.

THE J. D. ESTE COMPANY

1534 Sansom Street PHILADELPHIA

SAVES



Maintenance

You have charges against resistance maintenance if you use cast grids. They corrode and have so many joints that they soon open up. E. M. B. resistances eliminate 95% of the joints, are rustproof and when you put them on the car you can forget them.

Labor

The best way to adjust the steps on resistances is the "cut and try method." With E. M. B. resistances the loops in the material are used for terminals—each loop is a tapping point. Note how easy it is to shift from one terminal to another.

Cost

Cast grids break in shipment, they break in handling and in Service. E. M. B. grids are *unbreakable*. The material is drawn—not cast, and being rustproof is practically indestructible. Their eventual cost is therefore lower than that of cast grids.

Write us for data sheet which will enable you to give us just the right material for quoting.

The Ellcon Company

50 Church Street, New York

3158

"UP TO THE MINUTE"
ELECTRIC RAILWAY CARS

Call for Ellcon Porcelain Enameled Barriers and Stanchions and Aero Metal Fittings



Showing Ellcon Aero Metal Fittings on New York Municipal Railway Car.

The Ellcon snow-white enameled, hygienic stanchions and Aero metal fittings which are going into modern cars all over the country are the finest product of the art. Baked glass-hard at a high temperature, they are indestructible from ordinary causes, and are easily and rapidly cleaned. They are ideal for "public relations" considerations and are permanent value-adders to the cars.

The New York Municipal Railway Corporation has specified them for its new subway cars (illustrated). The New York Railways have furnished their 150 center-entrance cars with them, and when the New Orleans Railway and Light Company wanted to meet the question of cleanliness plus durability in stanchions and general fittings for its new cars it ordered Ellcon Porcelain Enameled Stanchions and Aero Metal Fittings. They are also in use on or have been specified on many other car orders.

Ellcon Enameled Fittings and modern car equipment are synonymous.

Write us for all the facts.

The Ellcon Company
50 Church Street, New York

300,000 VOLTS

is handled without difficulty by the

PITTSBURG HIGH VOLTAGE INSULATORS

under all weather conditions.



They erect a wall of safety around high voltage transmission. The secret of this efficiency lies in the blending of the art of porcelain-making and electrical knowledge.

The Pittsburg High Voltage Insulators are the result of years of elaborate tests from the pottery to the electrical transmission line. That the Pittsburg High Voltage Insulators satisfy the most exacting requirements is evidenced by its wide use wherever light, power, railroading or any other electrical transmission is applied.

Will you let us be your consultants?

We are interested in your insulating problems.

The Pittsburg High Voltage Insulator Co.

Main Office and Factory, DERRY, PA.

Canadian Representatives, the Canadian General Electric Co.
New York Office, 114 Liberty St.

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JOHNS-MANVILLE SERVICE TO THE ELECTRICAL INDUSTRY



MAINTENANCE

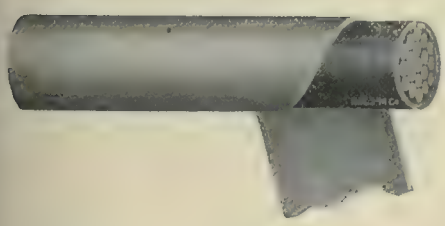
As you read the maintenance articles in this issue, they will perhaps suggest the thought of maintenance materials.

Johns-Manville Products are maintenance materials each of which has proven itself and earned its reputation in service.

The marketing of these maintenance is governed by a policy known as

Johns-Manville Service

—a service that renders every cooperation before and during the purchase of materials and afterwards stands sponsor for the results of their performance.



What J-M Niagrite Means to the Electric Railway Engineer

The covering of those parts of cables that are unprotected by ducts or lead sheathing, such as the terminals of cables in tunnels or manholes, on cable rocks and back of switchboards is recognized as important. This is particularly true where large cables and, therefore, heavy currents are handled.

The atmospheric conditions in tunnels and manholes and the necessity of fireproofing cables against heavy current surges or even short circuits, call for a material that must be generally applicable.

J-M Niagrite is such a material. It is a dense felt compound furnished in the form of a listing wrapped on the cable and then impregnated with J-M Fire-and-Water-Proof Cement. The result is a sheath that is as hard as bone, a fire retardent, and absolutely waterproof.

We are selling more J-M Niagrite every year to Electric Railways. May we add you to the list of users? Ask nearest branch for particulars.

J-M Niagrite is one of the many textiles we carry. Everything is asbestos sheets, tubings and listings for all purposes.

Did You Ever Get a Report Like This?

"The last shipment of slate we received had several slabs broken."

This is why J-M Ebony Asbestos Wood is supplanting slate and marble for electrical work.

You can still have your "oiled finish Monson" appearance or Black Enameled if you prefer it, so there will be no trouble matching up your panels on switchboard additions.

This material is strong mechanically and dielectrically much superior to slate or marble. It can be readily machined with regular tools.

It is obtainable in all shapes and thicknesses so that it is generally useful all over the system.

All your distribution Board Mountings and linings can be made of this material as well as those little special jobs that you work out for yourself.

H. W. JOHNS-MANVILLE COMPANY

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark, N. J.	Pittsburg	Salt Lake City	Washington
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Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver

3051

The Double Trolley System in Seattle

One of the Very Few Installed in This Country—It Contains Many Interesting Features, Some of Which Are Explained in Detail

BY H. J. KENNEDY, ELECTRICAL AND MECHANICAL ENGINEER.

Particular technical interest attaches to Division "A" of the electric railway recently put into operation by the street and alley intersections (often diagonal), entrances, existing poles, cross lines, etc., and varied from

The feeder system at present installed is considerably less than that designed for ultimate installation when the line is extended and the traffic becomes very much heavier than at the present time. Five feeder-circuit breakers were installed in the substation, with space for some additional ones. Only three have been utilized at the start, one feeding a pair of 1,192,500 circ. mil aluminum cables (each equivalent to 750,000 circ. mil copper), extending northerly and westerly to near the outer end of the line; another tapped on by 638,000 circ. mil aluminum cables (equivalent to 400,000 circ. mil copper) to trolley wire opposite substation, and another pair of 1,192,500 circ. mil aluminum cables extending south. Feeder taps are located from 1000 ft. to 2270 ft. apart, with section breaks between them. With this arrangement of feeders, with ten cars in operation on the division and 600 volts emf at Aloha Street, it is estimated that the maximum drop would be experienced at the outer end of the line, being about 61.5 volts or 10.3 per cent at the furthest feeder tap. Near the southerly end the drop is less. On the initial installation, a saving in first cost of more than $3,000 was made by using aluminum instead of copper, the price per pound of aluminum cable being 22.3 cents delivered at Seattle, while copper cable was 15.6 cents per pound, the total weight of aluminum required being of course very much less for equal conductance.



SEATTLE MUNICIPAL RAILWAY—EXTERIOR VIEW OF SUBSTATION

7147-P

$3,000 Saved by installing ALUMINUM CONDUCTORS

That saving, too, takes into account only the saving in first cost of aluminum over the cost of copper. The saving by reduction of number of poles, with pins, insulators, etc., possible through the use of longer spans practicable because of the light weight of aluminum, largely swells the above figure. Reduced maintenance charges is a vastly important item; don't forget that Aluminum is advancing as the ideal metal for feeders and transmission lines. It is advancing because it *pays*. Make it pay *you*. Write for data.

Aluminum Company of America

Pittsburgh, Pa.

New York	99 John Street
Boston	131 State Street
Chicago	Old Colony Bldg.
San Francisco	118 New Montgomery Street



Standard on the Illinois Traction System

The RYMCO High Speed Automatic Trolley Switch

The Illinois Traction System has left no stone unturned to achieve the highest possible safety. It not only practices safety, but capitalizes it through publicity.
Its use of Rymco products is therefore significant.

Our Steel Back Brake Shoes

The Railway Materials Company, Chicago, New York

Diamond Tapered Steel Poles the "Permanent" Way



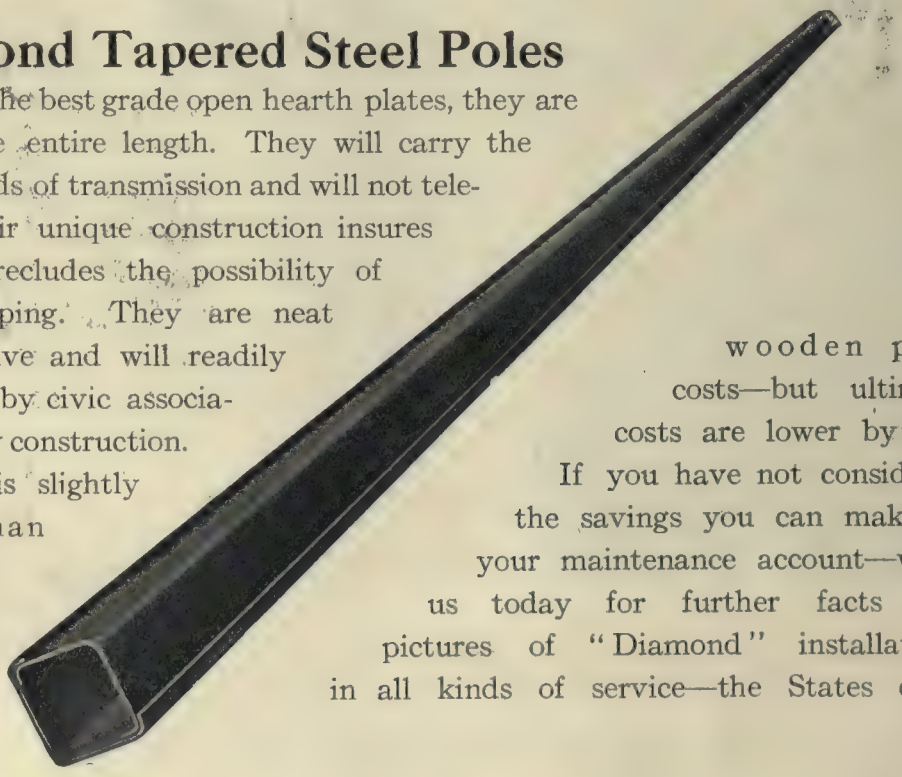
The "Permanent" Way Pole Construction on Electric Railway

It has been estimated, and conservatively so, that electric railways spend annually upwards of $55,000,000 for maintenance and replacement alone.

Your maintenance and replacement costs form a share of this enormous sum, which annually eats up 10% or more of your gross. What share of this is spent on the maintenance and replacement of your wooden pole lines? Whether it be 1 or 20 per cent it is worth saving and you can save it each year by building your pole line in the "Permanent Way"—*build it of steel.*

Diamond Tapered Steel Poles

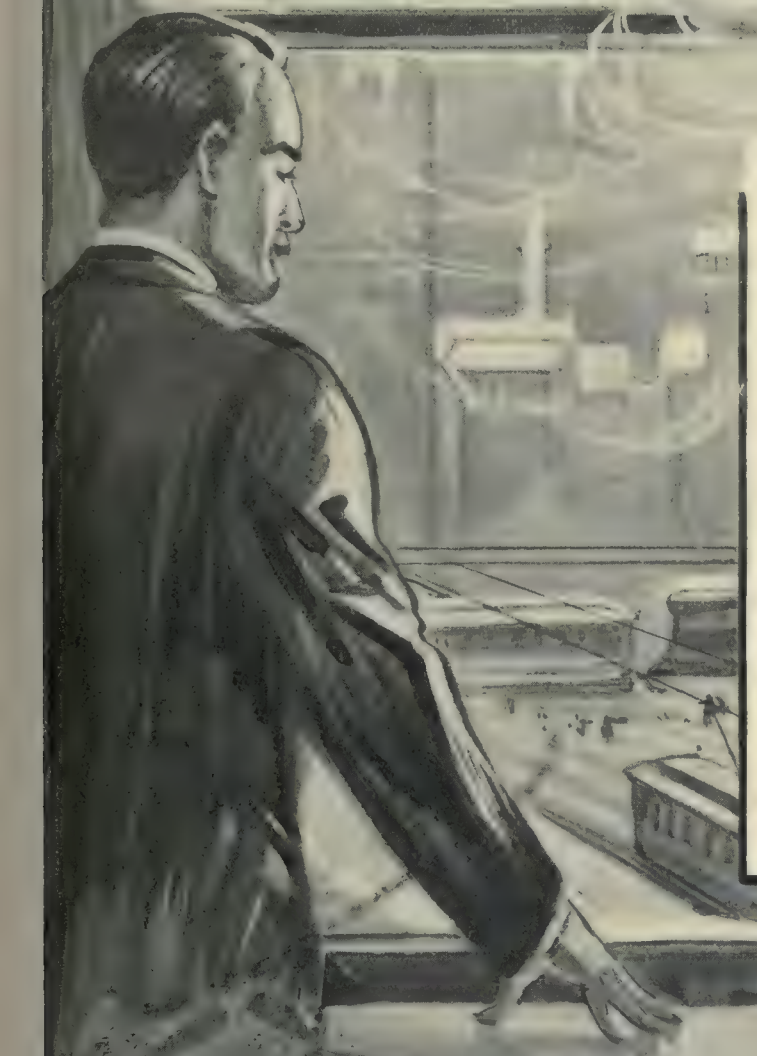
are built of the best grade open hearth plates, they are uniform the entire length. They will carry the heaviest loads of transmission and will not telescope. Their unique construction insures this and precludes the possibility of fittings slipping. They are neat and attractive and will readily be indorsed by civic associations for city construction. First cost is slightly greater than wooden pole costs—but ultimate costs are lower by far. If you have not considered the savings you can make in your maintenance account—write us today for further facts and pictures of "Diamond" installations in all kinds of service—the States over.



Diamond Steel Pole Co.

Philadelphia, Pa.

"Phono-Electric" Trolley Wire



Schedules Maintained All Along the Line

No matter where your lines may be — in the city or country — the question of service is uppermost in the minds of your patrons.

The most important factor in the accomplishment of the best service is in the installation of a trolley wire that is unusually strong and tough. A trolley wire that will give the longest service life and lowest cost of maintenance.

"Phono-Electric"

will give you long service life. It has more than twice the wearing qualities of hard drawn copper.

It has no hardened surface—is uniform throughout its cross-section.

IT'S TOUGH—saves renewals, and renewals cost money.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.

"Phono-Electric"

Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England



Safety That Cannot Fail

Northern Division, Pennsylvania Railroad
Crossing Protection at Farwell's Crossing, Near Ischua, N. Y.

Ivy L. Lee, Executive Assistant of the Pennsylvania Railroad, said recently:

"We must imbed in the public mind that the railroad men are doing their work as best they can."

This Policy is emphasized by the Pennsylvania Railroad by its use of

PROTECTIVE HIGHWAY CROSSING SIGNALS

The crossing is one of the important points of relation between the public and the transportation companies, and crossing protection is becoming an important consideration in railway work.

The PROTECTIVE SIGNAL MFG. COMPANY has combined the three elements of Simplicity, Safety and Economy in its devices, and has

1. Cut down cost of installation and maintenance.
2. Eliminated bond wires, insulated joints and track circuits.
3. Not required readjustment of signals, or track circuits, or track already in use.
4. Effected entire safety of crossing.

State your requirements to us, and we will match our signals—on trial—against your needs.

The Protective Signal Mfg. Co., Denver, Colorado

WILLIAM R. GARTON, GENERAL SALES MANAGER, 299 BROADWAY, NEW YORK, N. Y.

W. R. Garton Co., 11-17 So. Desplaines St., Chicago.
John S. Black Co., 908 Hennen Bldg., New Orleans.
Hoffecker & Phenneger, Richmond, Virginia.
The Allen General Supplies, Ltd., 205 Yonge St., Toronto.
Benton C. Moss, 501 East 16th St., Kansas City.
The O. H. Davidson Equipment Co., Denver, Colorado.



25

Business Still Booming

February was a **short** month—but
—it produced 16% as much business for us as the whole of 1914.
—it produced contracts for 25% of the whole number of United States Electric Signals contracted for in 1914.
—and yet 1914 wasn't a **bad** year.
There may be a business depression in the luxury line—but not for **necessities.**

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States
ElectricSignal Co.
West Newton Mass.

Foreign Representatives
Quilliam Erothers Clegg Court,
Chapel Street, Salford, England

—a Court of Last Resort

ON an interurban railway equipped with Nachod Automatic Signals and operating by telephone dispatching, it so happened that three motormen on separate occasions ignored, or forgot, all written or verbal instructions and forged ahead toward the single track, only to be stopped by the insistent and vigilant eye of the Nachod Signal looming up Red before them.

Thus Automatics are a check and not a substitute for train orders, telephone dispatching or positive meets.

Couldn't this happen on YOUR road? Wouldn't it pay to obtain this positive protection at the low cost of Nachod Automatic Signals?

The Nachod line comprises signals for single and double track, highway crossing bells, headway recorders, car annunciators, trolley contractors, relays, etc.

NOW is the time to investigate.

Remember:

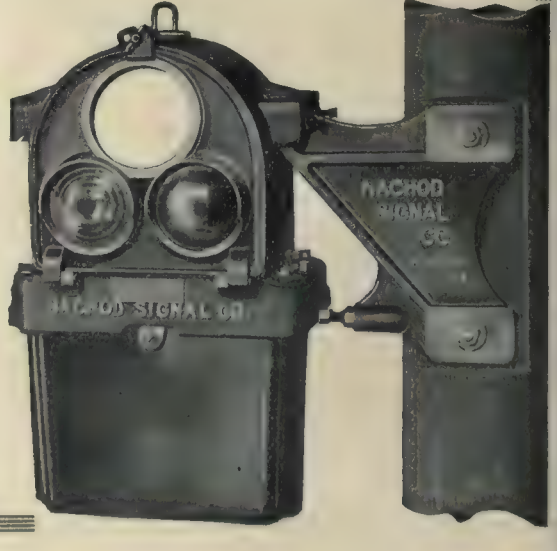
NACHOD

Spells

Safety

NACHOD SIGNAL CO., Inc.

Louisville, Ky.



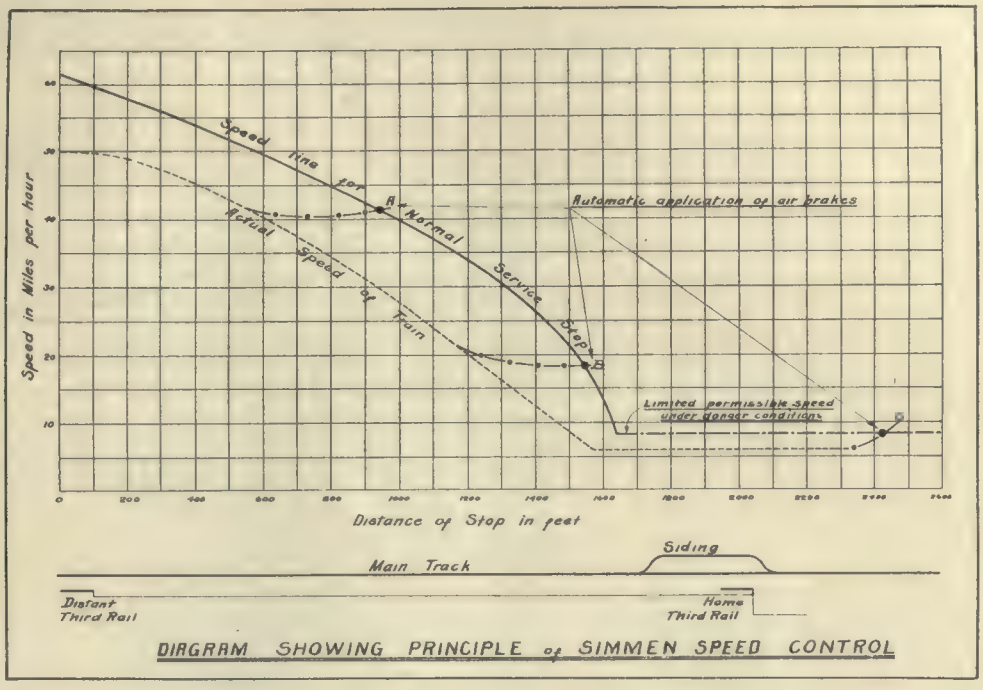


DIAGRAM SHOWING PRINCIPLE of SIMMEN SPEED CONTROL

Why the SIMMEN SYSTEM is gaining recognition



No student of the signal situation, approaching the subject with an open mind, can possibly avoid the absolute conclusion that conditions today are surely pointing in all fields to the ultimate adoption of the CAB SIGNAL in some form as the standard which will finally obtain, either by itself alone or in connection with other forms of signals.

A recent event pointing in this direction is the adoption of SIMMEN CAB SIGNALS and SIMMEN AUTOMATIC SPEED CONTROL by the New York Municipal Railway Corporation for the new Brooklyn Subways, where the highest type of signaling is required.

The Simmen System has broken absolutely new ground. It has been developed on fundamental principles. It contends, not merely for the same efficiency as the older standards, but a much higher efficiency. That its cost is less than the old standards is incidental. It is not merely different in METHODS, but is different in the production of RESULTS.

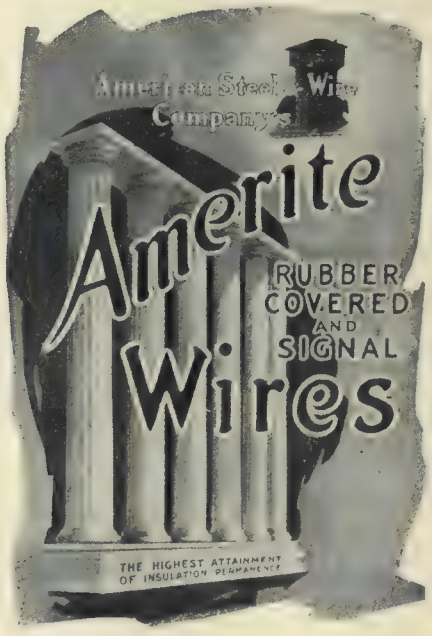
The recognition it is receiving is not based merely on the principle that it produces the SAME results as the older standards, AT A LOWER COST, but that it produces—First: A higher standard of SAFETY and EFFICIENCY than any signaling method so far devised. Second: That in addition to producing safety, it accomplishes results of the highest importance not possible by any other method, and then, Third: That it succeeds in doing these things at costs for installation and maintenance which are far below the costs possible under the older standards.

THE SIMMEN SYSTEM

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
BUFFALO

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.
TORONTO

Economy Results from G



WE present these wires as the result of many years of exhaustive research and test under *service* conditions, assuring the greatest efficiency over the longest period of usage.

For Station Wiring, Arc Light and Signal Service, High Voltage Power Transmission Lines

These rubber-covered wires and cables are made to the most exacting specifications; in any size or finish and for all services and voltages. The insulation contains only the highest grade of pure dry Para rubber and other necessary preservative ingredients.

We make copper wire for all purposes in any required shape or size; copper cables of all capacities and degrees of flexibility; hard-drawn or annealed, bare or insulated. We also make galvanized iron and steel wire in all shapes and sizes, bare or insulated, and for all purposes—trolley, telephone and telegraph wires, armor wires, strand and wire rope of all kinds.

American Steel &

Chicago, New York, Worcest

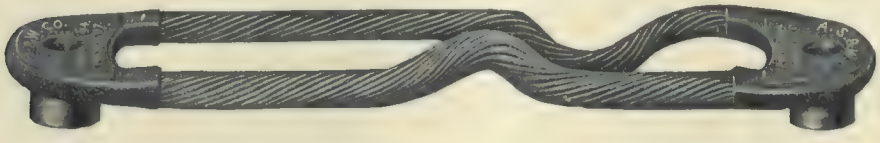
Export Representative: U. S. Steel Products Company, 30 Church Street, New York. P

d Materials well Installed

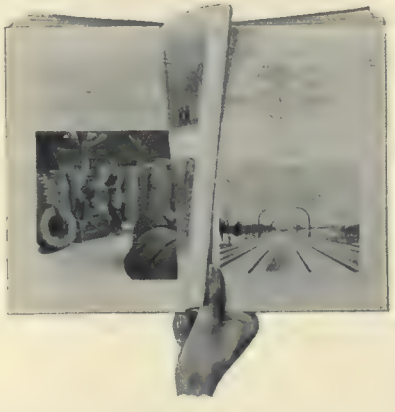
Lasting and Economic Service in Rail Bonds

Crown Rail Bonds **United States Rail Bonds**
Twin Terminal Rail Bonds **Soldered Rail Bonds**

WE are extensive manufacturers of all kinds of rail bonds. Nothing but pure drawn copper enters into their construction. Our bonds have been developed to the highest possible state of perfection, the workmanship is of the best, and their design is correct for long life and high efficiency. We also make a complete line of tools for installing rail bonds. Catalogue fully illustrating rail bonds sent on application. Our engineers are at your service.



There's a Fund of Valuable Data in this Catalog



234 pages of information, illustrations and engineering data covering a wide range of subjects of decidedly practical as well as technical value to engineers and operating men.

If you haven't one of these catalogues we shall be glad to hear from you. State whether particularly interested in wires and cables or rail bonds.

If you have this catalog get it out and look it over. You will find it especially helpful right now.

Wire Company

Cleveland, Pittsburgh, Denver

ast Representative: U. S. Steel Products Company, San Francisco, Los Angeles, Portland, Seattle.



64 regular electric cars and 18 regular steam trains have passed over this crossing daily for 25 months without showing any wear on the substructure. The crossing is still in excellent condition, while heretofore it was necessary to replace the crossing every 24 months.

Steel Foundations for Grade Crossings

are no longer an experiment. They are a demonstrated, economical success. After being subjected to the hardest kind of traffic for more than two years, the steel foundations of the crossing shown in the illustration herewith are found intact in every respect. Not even a bolt was loosened during the two years' service; not a particle of wear was noticeable on the steel longitudinals which carry the rails at the crossing; not a clip was sheared; not an inch of "creeping" was noticeable, and what is more important, the steel crossing itself had withstood the service during this period of twenty-five months with but little wear and is now pronounced fit for safe operation for four years more. This is notable in view of the fact that up to the time the International Steel Foundation was installed at this crossing the life of the crossing seldom exceeded two years. And this illustration is only one of many installations in all parts of the United States that are making good.

International Steel Crossing Foundations

show tremendous savings in the annual cost of installation and maintenance of tracks. They will give your crossings from two to three times the life that wood foundations give and still be in first class condition for carrying new crossing installations. Through increasing, by years, the life of the crossing they automatically reduce the crossing cost and at the same time reduce the maintenance cost.

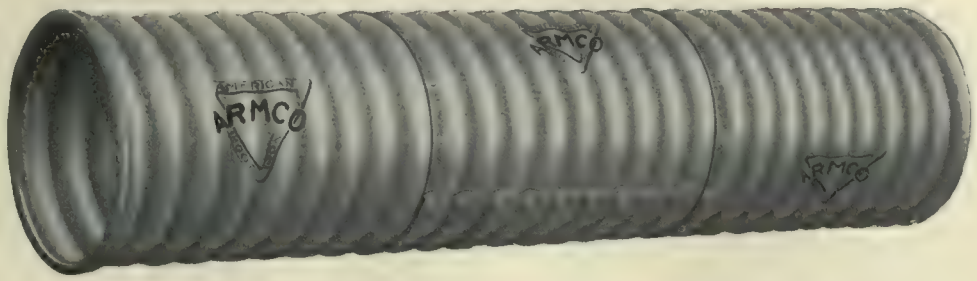
The design of this crossing foundation is a development of the International twin steel tie for paved street construction which we have been marketing successfully for the past seven years.

Many of these ties, and many of these steel crossing foundations, are now in use at many of the most important intersection points of leading steam and electric railways in all parts of the country. Both are conceded, by engineers who know, to be the last word in safe, sane and substantial construction.

The foundations are made for any desired angle.

Write for list of users and further details.

International Steel Tie Co., Cleveland, Ohio



Frost and Flood Heave and Hoist Rot and Rust

play the dickens with many railway drains and bridges. But not with

ARMCO AMERICAN INGOT IRON CULVERTS

Their corrugated form and overlapping joints give them ample strength to carry heavy fills and heavy traffic and a certain **toughness** that enables them to withstand the strains of shifting foundations.

The unequalled purity and evenness of their material results in an unequalled resistance to the action of the elements.

Write the Nearest Manufacturer for particulars and prices on Armco Corrugated Culverts, Siphons, Plates, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.

California, Los Angeles
California Corrugated Culvert Co.

California, West Berkeley
California Corrugated Culvert Co.

Colorado, Denver
R. Hardesty Mfg. Co.

Delaware, Clayton
Delaware Metal Culvert Co.

Florida, Jacksonville
Dixie Culvert & Metal Co.

Georgia, Atlanta
Dixie Culvert & Metal Co.

Illinois, Bloomington
Illinois Corrugated Metal Co.

Indiana, Crawfordsville
W. Q. O'Neall Co.

Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.

Kentucky, Louisville
Kentucky Culvert Co.

Louisiana, New Orleans
Dixie Culvert & Metal Co.

Maryland, Havre de Grace
Spencer, J. N.

Massachusetts, Palmer
New England Metal Culvert Co.

Michigan, Bark River
Bark River Bridge & Culvert Co.

Michigan, Lansing
Michigan Bridge & Pipe Co.

Minnesota, Minneapolis
Lyle Corrugated Culvert Co.

Minnesota, Lyle
Lyle Corrugated Culvert Co.

Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.

Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.

Nevada, Reno
Nevada Metal Mfg. Co.

New Hampshire, Nashua
North-East Metal Culvert Co.

New Jersey, Flemington
Pennsylvania Metal Culvert Co.

New York, Auburn
Pennsylvania Metal Culvert Co.

North Carolina, Greensboro
Dixie Culvert & Metal Co.

North Dakota, Wahpeton
Northwestern Sheet & Iron Works

Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.

Oklahoma, Shawnee
Dixie Culvert & Metal Co.

Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.

South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.

Tennessee, Nashville
Tennessee Metal Culvert Co.

Texas, Dallas
Atlas Metal Works

Texas, El Paso
Western Metal Mfg. Co.

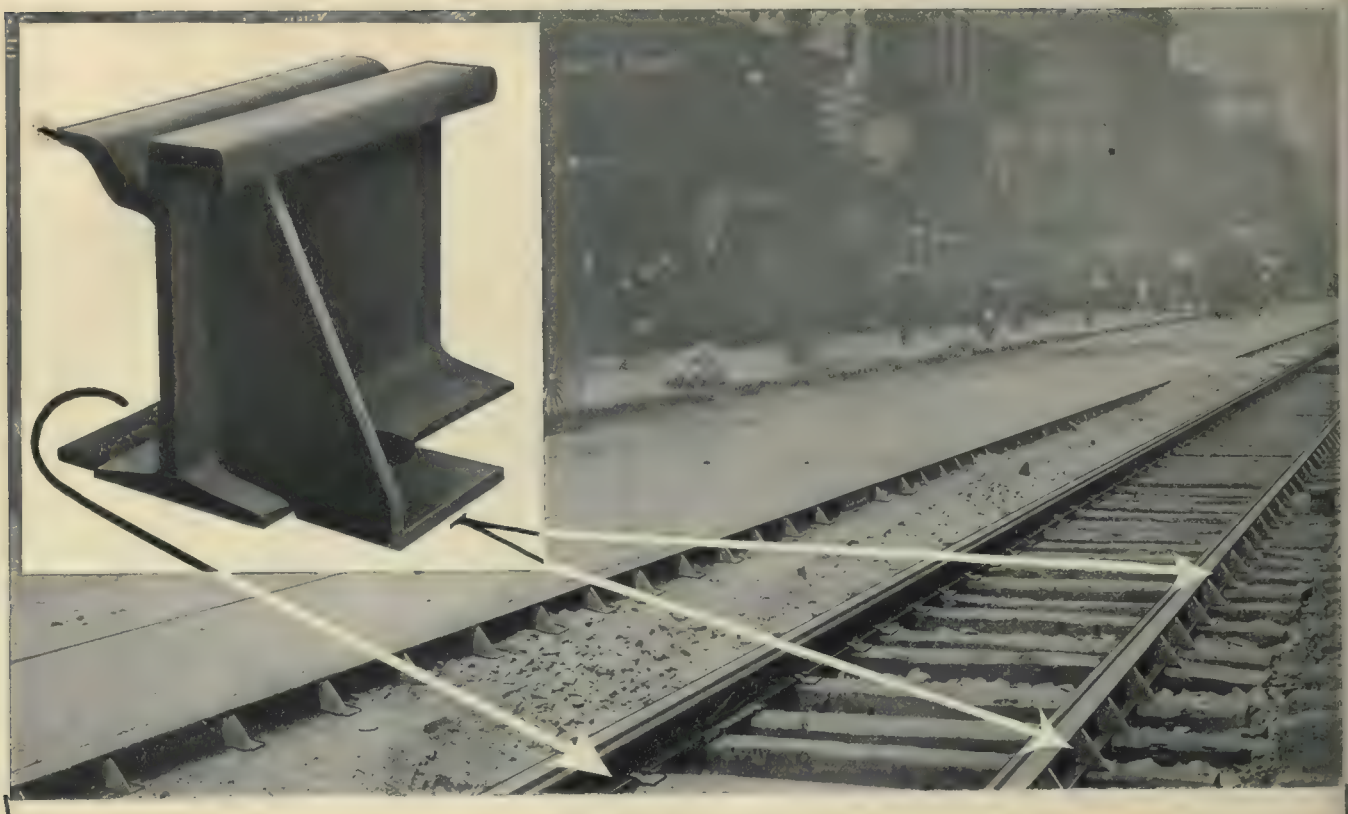
Texas, Houston
Lone Star Culvert Co.

Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.

Virginia, Roanoke
Virginia Metal Culvert Co.

Washington, Spokane
Spokane Cor. Culvert & Tank Co.

Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.



Tie Plate Rail Brace

Combination Rail Brace and Tie Plate

Save Ties

Eliminate Rail Drilling

Cost Less Than Tie Rods

Cheaper to Install Than Tie Rods

Save your ties. Reduce the cost of track construction. Cut the cost of track maintenance. Provide for easy paving between rails, instead of hindering it with tie rods. Do away with the rods. Install COMBINATION RAIL BRACE TIE PLATES. They need no rail drilling. Tie rods do.

Brace tie plates cost less than tie rods —give better service. Forged from open hearth steel for any rail section. Write for prices and list of users.

Can Be Used Repeatedly

Do Not Interfere with Paving

Made for Either Girder or "T" Rails

Write for Samples

STEEL CAR FORGE COMPANY

Pittsburgh New York Chicago

Works: Ellwood City, Pa., and Hammond, Ind.

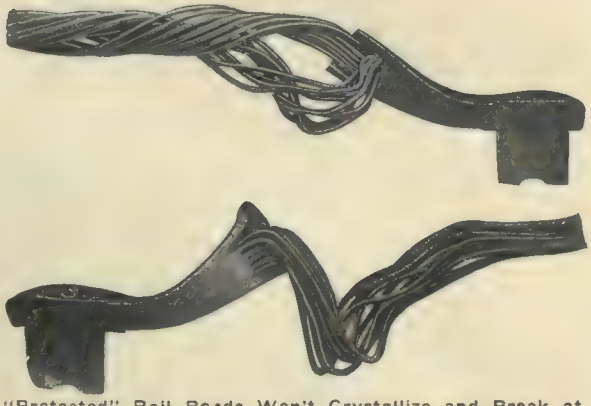
7248-P

You Ask Why "Protected" Rail Bonds Will Cut Your Maintenance Costs? Here Are the Answers—

The "Shot-Over" Sleeves

A Standard P-4 Cable Bond, terminal sawed lengthwise and strands pulled apart to show the "Shot-Over" sleeve. Note that strands are absolutely free and in their original shape. They are not cramped or welded together. They have not been flattened. They have not been heated enough to soften or to oxidize. They are not in the least distorted. They are not reduced in area.

The copper strands are in their original shape and original condition *for a limited distance inside this protecting sleeve.*



"Protected" Rail Bonds Won't Crystallize and Break at This Point

Soft, Dense Terminal Copper

A Type L 300,000 C. M. Bond, whose terminal diameter was normally ⅞ inch, length 1 inch. Placed in a hydraulic compressor and by this means compressed to an average length of ⅜ inch, the mean diameter increasing to 1¼ inches *— and without a crack or imperfection developing.*

A Type F-6 Bond, terminal normally ¾ x 11/16 inch, was likewise compressed and then hammered to a length of ¼ inch and a mean diameter of 1¼ inches, *without a crack or imperfection developing.*

Surely these are supreme tests of a rail bond terminal, tests far more severe than would ever be met in service.

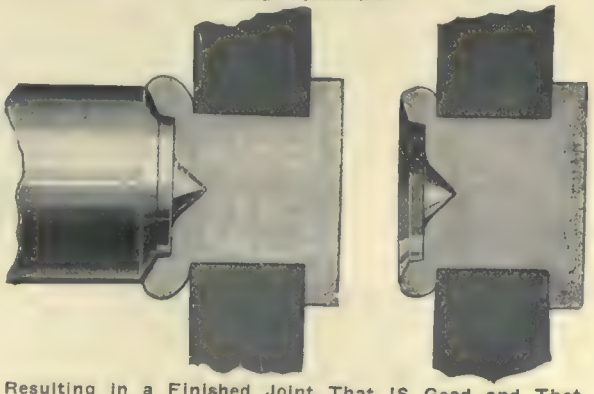


Showing the Wonderful Malleability of "Protected" Rail Bond Terminals

A Contact That Lasts

With their body portions made from pure lake copper, protected at their junction with the terminals by the famous "Shot-Over" sleeves; with terminals of soft, dense copper, copper so soft that it may be compressed into the very pores of the steel of the rail, is it at all surprising that "Protected" Rail Bonds give the service that they have been giving for years? *Is it surprising that over eight millions have made records for efficiency and service excelled by no other type of bond?*

This is the bond we offer you for your work. Why not use it?



Resulting in a Finished Joint That IS Good and That STAYS Good

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

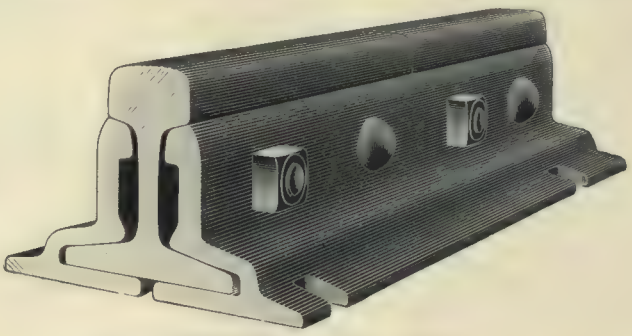
PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

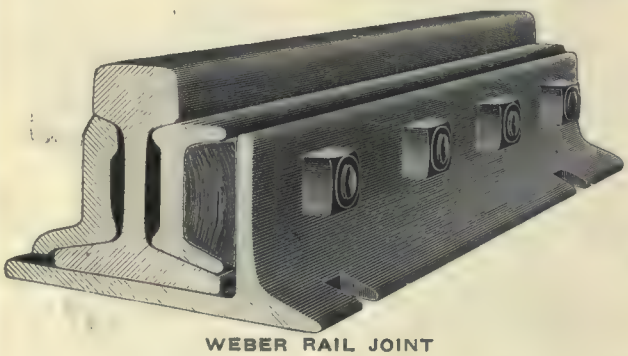
CHICAGO
417 So. Dearborn St.

The Rail Joint Company
185 Madison Avenue
New York

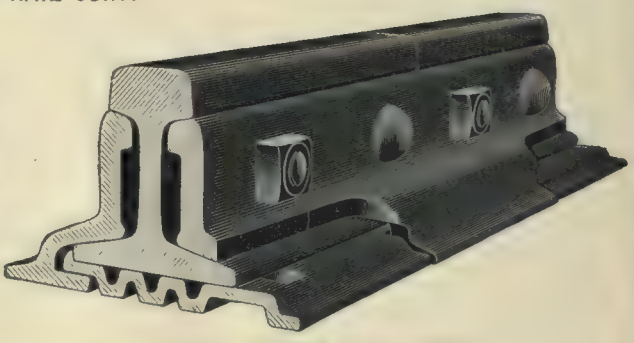
Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches: Insulated Rail Joints, and Step or Compromise Rail Joints. Patented in United States and Canada.



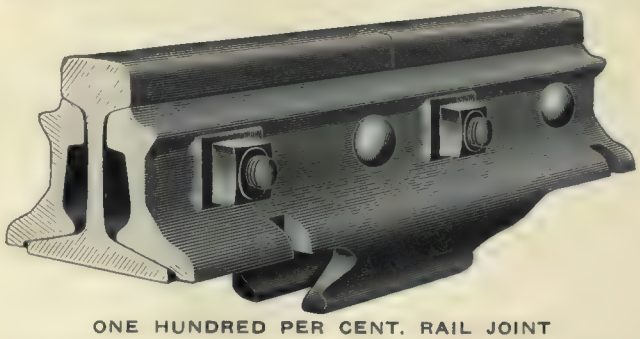
CONTINUOUS RAIL JOINT



WEBER RAIL JOINT



WOLHAUPTER RAIL JOINT



ONE HUNDRED PER CENT. RAIL JOINT

THE RAIL JOINT COMPANY'S product is not in an experimental stage; it is an acknowledged standard. Not only the best for the price but the best for the purpose.

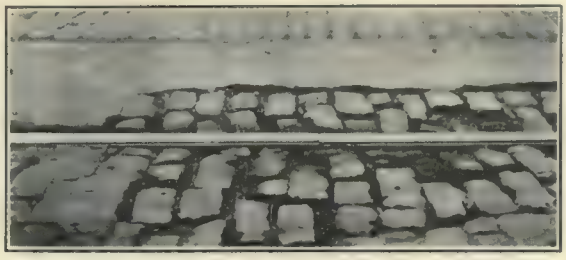
See our Exhibit at the Panama-Pacific International Exposition, Palace of Transportation, Block 1, East End.

Best Quality Hot-Worked HIGH CARBON STEEL used exclusively.
Oil-Quenched when desired.

Catalog and full information furnished at all Agencies

BOSTON, MASS., India Bldg.
CHICAGO, ILL., Railway Exchange Bldg.
DENVER, COLO., Equitable Bldg.
MONTREAL, CAN., Board of Trade Bldg.
PHILADELPHIA, PA., Pennsylvania Bldg.
PITTSBURGH, PA., Oliver Bldg.
PORTLAND, OREGON, Wilcox Bldg.
ST. LOUIS, MO., Commonwealth Trust Bldg.
TROY, N. Y., Burden Ave.
LONDON, E. C., ENG., 36 New Broad St.





You Know

You know that mechanical rail joints develop into such conditions as shown above.

You know that every such joint means tearing up of pavement at great expense to make repairs.

You know that such conditions decrease the life of your rails and the life of your rolling stock.

You know that your electrical engineer is always complaining about the loss of current due to such conditions.

You know that such conditions may result in damage by electrolysis and consequent law suits.

You know that you have been up against such conditions during all the years you have used mechanical joints.

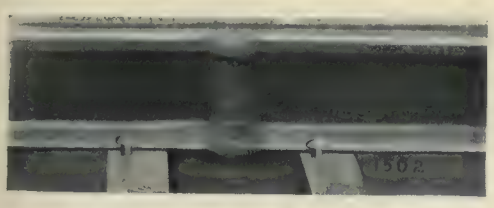
You know that at this season of the year you are contemplating ways and means to overcome such conditions.

Then, why not take advantage of what

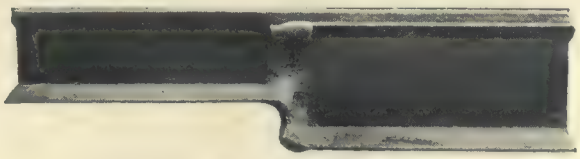
We Know

We know that to overcome your trouble you must eliminate the joints from the track. That is what our Thermit Rail Welding Process accomplishes. We weld the whole rail section and give you a continuous rail with all joints eliminated.

We know that our pamphlet No. 3932 will be of service to you. Write for a copy.



Finished Thermit Fully Welded Insert Rail-Joint



Thermit Fully Welded Insert Compromise Joint

GOLDSCHMIDT THERMIT CO.

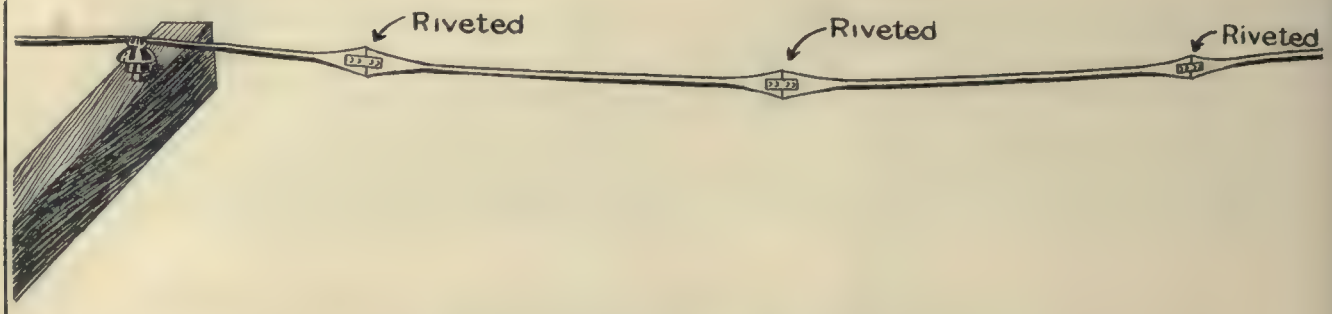
WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco

103 Richmond St., W., Toronto, Ont.

7300 So. Chicago Ave., Chicago



"Nothing Doing"

you say, when we try to get you to use this kind of a joint for your overhead transmission lines.

But

your return circuit carries the same amount of current that the overhead lines do.

Then

why use riveted joints in the return circuit?

Electric Weld Rail Bonds
do not corrode at the terminals.

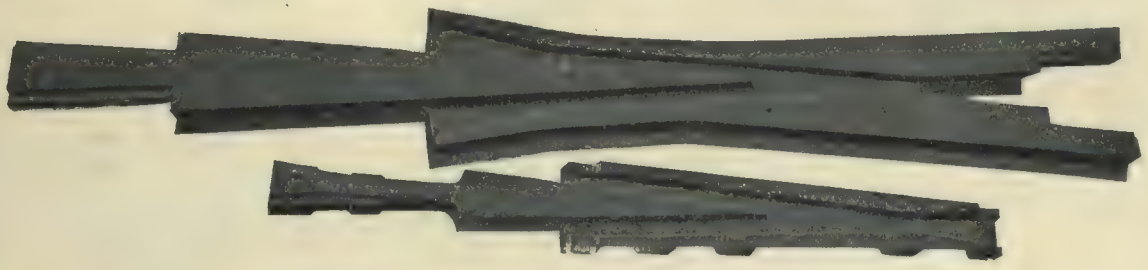
The Electric Railway Improvement Co.

Cleveland, Ohio

7187

Stroh Process Steel

For Street Railway Special Work



FROGS — CROSSINGS — INSERTS

Harder than Manganese Steel

Will Not Spall Nor Flow

Long Lived—Economical

The Stroh Process is not a case hardening or a heat treatment. It is a method for casting Stroh Alloy Steel (the greatest known wear resistant) together with ordinary soft steel in one solid piece. The resultant casting has a wear-proof alloy steel stratum upon the wearing surfaces, while the body is composed of any desired steel and is in no way affected. This alloy can neither come loose, nor spall, nor spread nor flow. Its depth or thickness, its location and its hardness are completely controlled and are varied according to the size of the piece and the nature of service expected.

Our descriptive bulletin will interest you. Send the coupon.
Our prices will also be of interest. Send us your inquiries.

KENNEDY-STROH CORPORATION

Sole Proprietors of the Stroh Process

Pittsburgh, Pa.

Enclose this Coupon with Letterhead or Business Card
Kennedy-Stroh Corporation, Pittsburgh, Pa.
Forward me at once a copy of the Stroh Process Bulletin.

Name.....

Street.....

City.....

State.....

E.R.J. 3-20-15

Falk Special Track Work

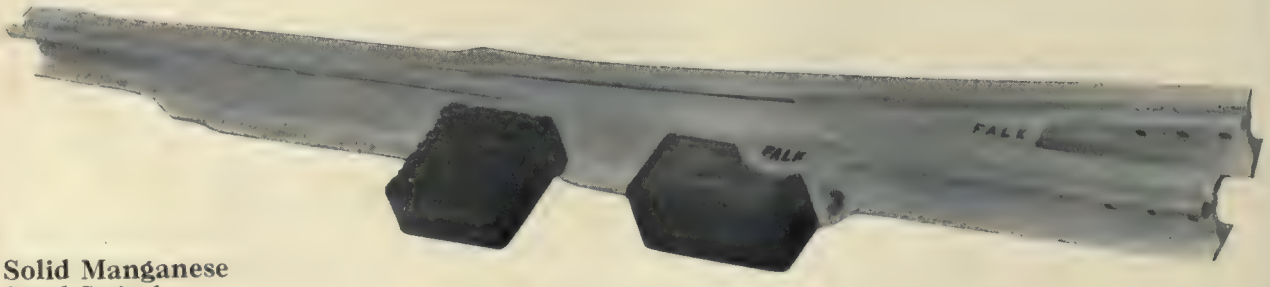
DOES REDUCE YOUR MAINTENANCE CHARGES



Manganese Insert Frog with Cast Steel Body



Manganese Insert Cast Iron Bound Mate



Solid Manganese Steel Switch

These Three for Maximum Service

The Falk Company

Milwaukee

NEW YORK CITY—Wendell & MacDuffie Co.

LOS ANGELES—Alphonso A. Wigmore NEW ORLEANS—A. M. Lockett & Co.

These Men are Grinding an Average of 300-ft. per day

Cost per Foot, .0206 Cents
Cost per Day, $6.20

Ask the Mobile Light & R. R. Co.

Reason:

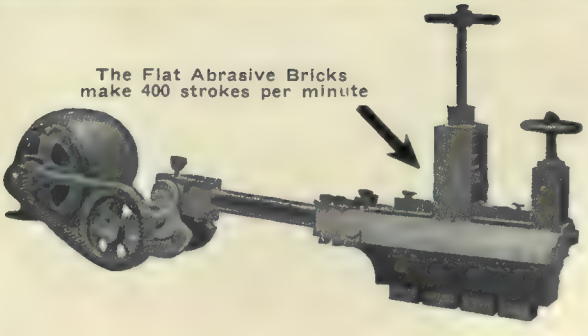
The Reciprocating Track Grinder



Having These Essentials

1. A *flat* grinding surface.
2. *Reciprocating* Motion.
3. Forty square inches grinding surface.
4. Four Hundred Strokes per Minute.
5. *High* Wheel derail.
6. No fine adjustments for pressure.
7. It will grind rapidly, economically and accurately.
8. It will grind hammered joints and make them serviceable for years to come without need for shimming up or use of step joints.
9. It will grind new joints to such perfection that hammering or cupping will be of remote occurrence.
10. It may be operated by common labor and, in such hands, is not likely to damage the track.
11. It will be self contained, requiring no motor car to complete the outfit.

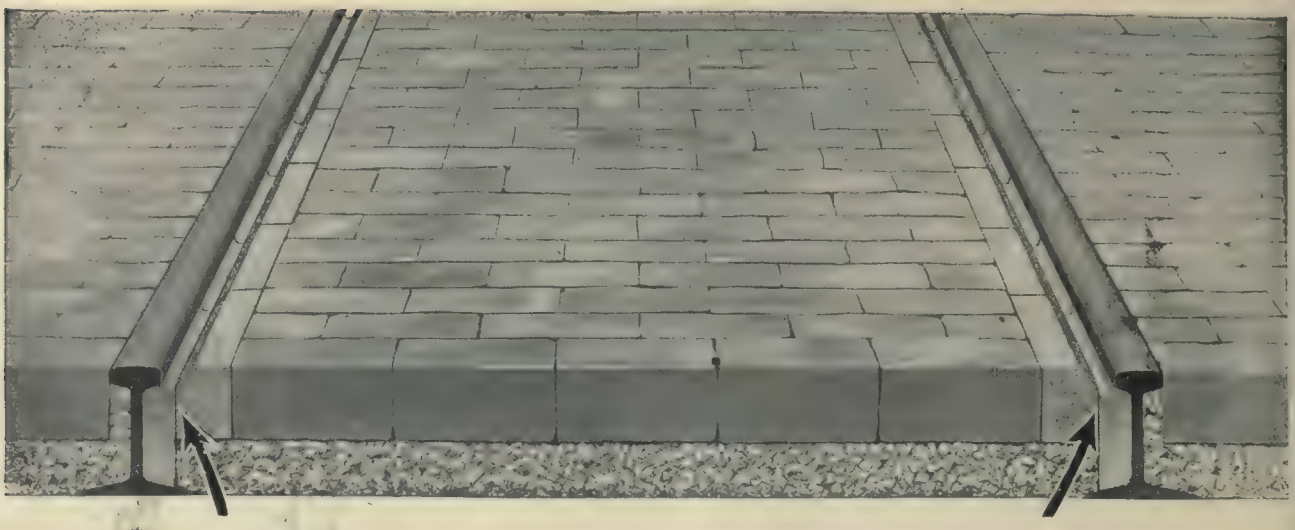
Write for data and price.



Railway Track-work Co.

Heed Bldg., Philadelphia

3122



Economize

—on Rail
—on Maintenance

You know the substantial saving in first cost which T-rail track permits. Electric Railway officials in over a hundred cities can tell you what the saving on paving maintenance amounts to when protected with

NELSONVILLE
FILLER AND STRETCHER BRICK

This common-sense and effective track construction has won the cordial approval of city officials wherever it has been installed. It results in more sightly track—a better joint between the paving slab and rails—and a perfected paving which does not break down under the vibration of traffic.

The filler brick block firmly fits against the rail, and fills the gap between ball and flange. The stretcher brick is bonded to the paving block between the rails. The joint between the stretcher and filler bricks remains ungrouted—no vibrations pass from the rail to paving—filler slides freely against side of the stretcher.

Twenty-five years' experience and the best paving block clay go into the making of Nelsonville Brick.

Write for a copy of "Rail Brick of the Right Sort."

The Nelsonville Brick Company

Nelsonville, Ohio

9232



"By Jove! Why didn't I install Pulmotors

like the Pittsburgh Railways did before This Accident Happened! George Woodman my best Transformer foreman has been electrocuted.— The Doctor said a Pulmotor would have saved him as he was alone and couldn't keep up respiration by hand long enough to do any good."

Progressive electric railways—large and small—from coast to coast—have adopted the Pulmotor. A partial list follows:

Birmingham Ry. Lt. & Pwr. Co.
Fort Smith Lt. & Trac. Co.
British Columbia Elec. Ry. Co.
Los Angeles Ry. Corporation.
Pacific Elec. Ry. Co.
Arkansas Valley Ry. Lt. & Pr. Co.
Athens Ry. & Elec. Co.
DeKalb, Sycamore Int. Ry. Co.
Terre Haute, Ind. & E. Trac. Co.
Iowa Ry. & Light Company.
New Orleans Ry. & Light Co.
Bangor Ry. & Elec. Co.
Bristol & Plainville Tramway Co.
Benton Harbor-St. Joe Ry.
Muskegon Trac. & Lt. Co.
Hattiesburg Trac. Co.
The S. W. Missouri Ry. Co.
United Railways Company (St. Louis)
Butte Elec. & Pr. Co.
Public Service Ry. Co.
Hudson & Manhattan R. R. Co.
Rochester Ry. & Lt. Co.
Northern Ohio Trac. & Lt. Co.
Toledo Ry. & Lt. Co.
Bartlesville Int. Ry. Co.
Portland Ry., Lt. & Pr. Co.
Pittsburgh Ry. Company.
Charleston Consol. Ry. & Lt. Co.
Nashville Ry. & Light Co.
Northern Texas Trac. Co.
Chicago, Milwaukee & St. P. R.R. Co.
Washington Ry. & Elec. Co.
Milwaukee Elec. Ry. & Lt. Co.
Wisconsin Elec. Ry. Co.

When will your company join the ranks? Don't wait until it is too late.

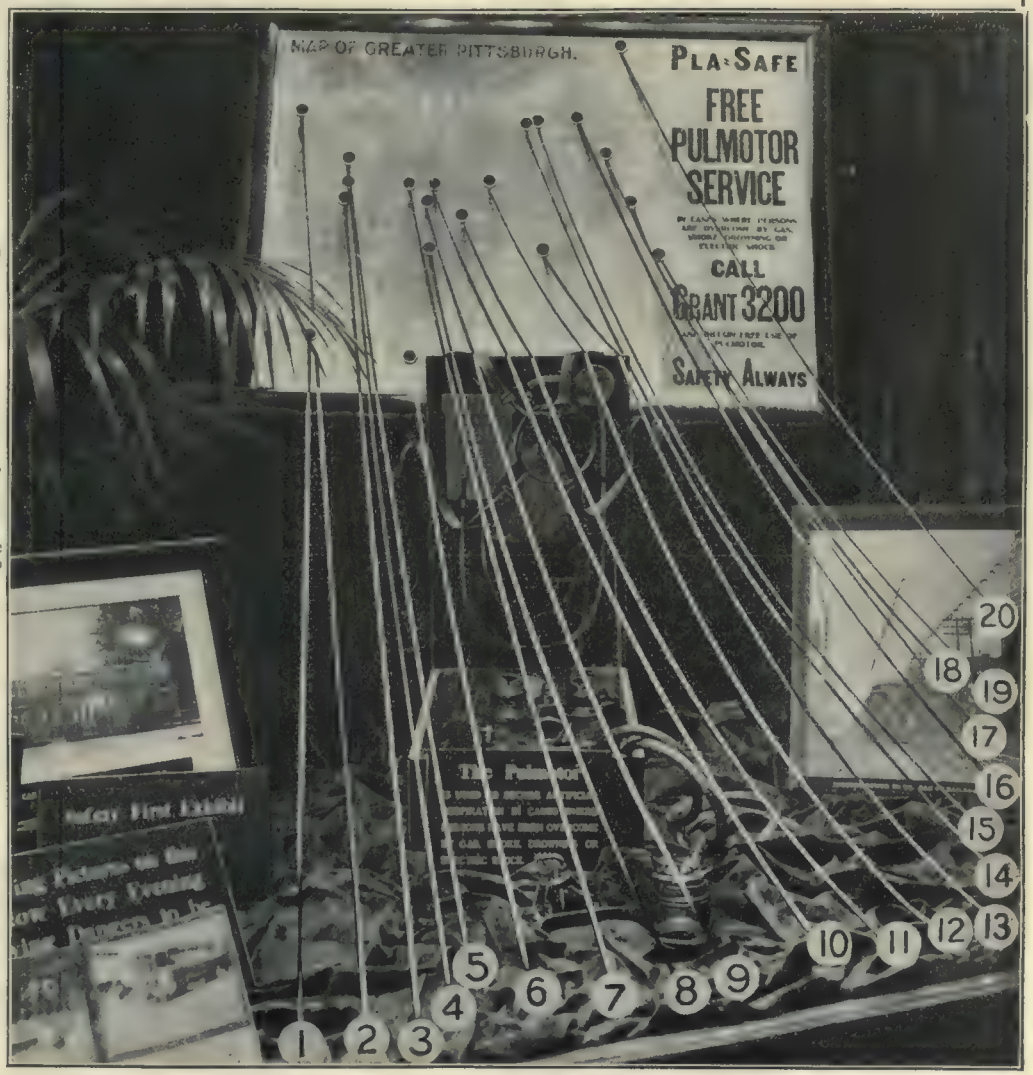
DRAEGER OXYGEN APPARATUS CO.

432 First Avenue
Pittsburgh, Pa.

Also Special Agents for

THE WOLF SAFETY LAMP CO. OF AMERICA

47 West Street
New York City



PITTSBURGH RAILWAYS INSTALLATION OF PULMOTORS IN PITTSBURGH DISTRICT:

1-Carnegie Sub-Station. 2-Bellevue Sub-Station. 3-Esplen Sub-Station. 4-Brunots Island Power Station. 5-North Side Sub-Station. 6-Washington Junction Sub-Station. 7-Allegheny Heating Co. 8-Tunnel Sub-Station. 9-Philadelphia Building. 10-13th St. Power Station. 11-Equitable Gas Co. 12-Oakland Sub- Station. 13-Glenwood Power Station. 14-East Liberty Sub-Station. 15-Equitable Gas Co. 16-Homewood Shops. 17-Wilkinsburg Sub-Station. 18-Rankin Power Station. 19-McKeesport Sub-Station 20-Verona Sub-Station.

Outside of County—Riverview Sub-Station (Monongahela, Pa.) Tylersdale Sub-Station (Washington, Pa.)



If it's a J. A. J.

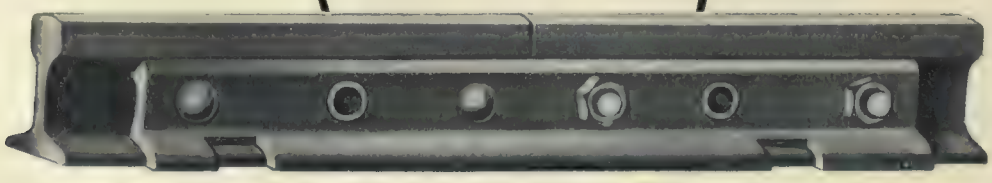
You Can Forget Electrical Resistance in Your Bond

As a result of the perfect bonding you get entire electrical contact with the J. A. J., without the conversion of current into heat at the bond, as with cables or strips of copper.

Quick method of application—since the J. A. J. is designed for insertion in the same holes as the bolts, and the installing copper coats fish-plate and rail.

The J. A. J. makes one rail out of the thousands that constitute the line.

We have a proposition in which we believe you will be interested. Write us.



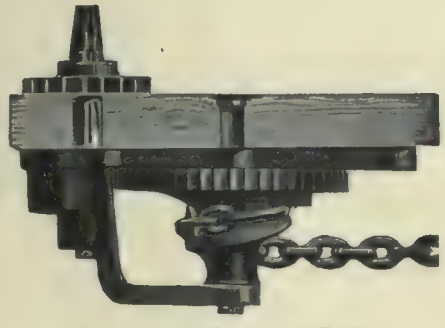
The Jamison Rail Bond and Electrical Supply Co.

202-203 Keystone Bldg., Pittsburgh, Pa.

29

Savings in Brake Maintenance

Pay for Peacock Improved Brakes



The Peacock Improved Brake



You can't put any old hand brake on the cars and expect the maintenance cost to be low.

It is excessive maintenance cost that makes cheap brakes expensive.

It is the absence of maintenance cost that makes the Peacock Improved Brake lower in cost than cheap brakes.

Hand brake costs amount to far more than is generally imagined.

A Superintendent of Equipment on one of our large roads recently pointed out to the board that the hand brakes they were operating cost far too much to maintain.

He showed in figures how he could scrap the old brakes and pay for Peacock brakes inside of one year.

And **he** was **conservative.**

Reduce your maintenance by ordering Peacocks NOW for every car without them.

NATIONAL BRAKE CO.

888-890 Ellicott Square, Buffalo, N. Y.

Poor Richard says:

"A dollar saved is a dollar earned."

We insist that we have something that will save the dollars. This is the

CHAPMAN
AUTOMATIC SIGNAL



We have been emphasizing the advantage of this for three years.

If you haven't considered it, you should do so now. It is an absolutely-to-be-depended-upon signal. There is no user who would part with his or change for another make. It is earning and saving the dollar for your neighbor. Why not put it to work for yourself?

Charles N. Wood Co.,
Boston, Mass.



Over Twenty Years Standard for Electric Railway Line Insulation

For more than two decades Aetna Insulating Material has held foremost place in the electric railway insulation field. Quality, service, economy, are the strong planks in the Aetna platform that have maintained its prestige in the past and shall uphold it in the future.

TRADE MARK. E A A AETNA REGISTERED

Aetna Insulating Material

is incorporated into the structure of many well known Anderson Line Insulating Specialties and to the value of Aetna they largely owe their great efficiency and long life in service.

Wherever electric railways span the earth Anderson Line and Insulating Material is found **proving** that the name Anderson stands for **quality** and **service.**

ALBERT & J. M. ANDERSON MFG. CO.

Established 1877

289-293 A Street, Boston, Mass., U. S. A.

BRANCHES:
New York, 135 Broadway.
Chicago, 105 So. Dearborn Street.
Philadelphia, 429 Real Estate Trust Bldg.
London, 48 Milton Street.

7698





Boston Elevated Orders Grade M

Six hundred and seventy-five Grade M Gears and the same number of Grade M pinions have just been ordered for immediate service by the Boston Elevated Railway Company for use on its surface lines.

The new trailer service to be inaugurated by this road will require gearing of exceptional strength and wearing qualities.

Although Grade M gearing has been on the market but three years, ninety roads in this country alone are using these gears and pinions with absolute satisfaction. Grade M gearing has proved its title as the "more miles per dollar" gearing.

Ask the roads using it.

General Electric Company

General Office: Schenectady, N. Y.

ADDRESS NEAREST OFFICE

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
(Office of Agent)
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
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5418

G-E Outdoor Aluminum Arresters

Have Strong Mechanical Construction

Strong, compact and well braced pipe work gives stable support to horn gap mechanism and wiring.

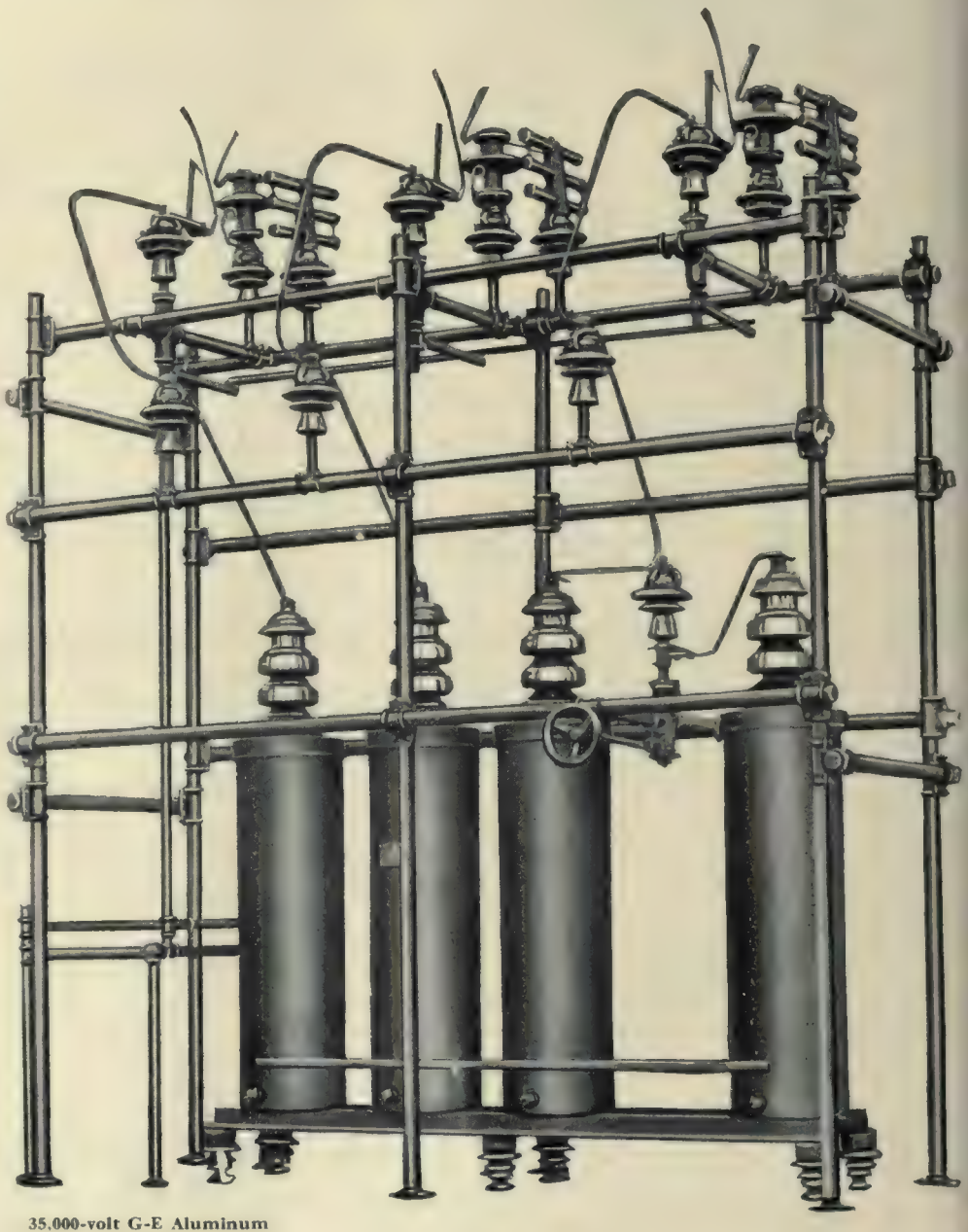
Construction readily permits placing wire screen around framework.

Lever operated horn gap.

Transfer switch located between tanks, and hand wheel operated.

Tanks and pipes galvanized, all pipe and insulator fittings, transfer switch gears and handwheel, sherardized.

These and other refinements promote safety and ease of operation and reduce installation and maintenance charges.



35,000-volt G-E Aluminum Arrester

General Electric Company

General Office **Schenectady, N. Y.**

List of Sales Offices on preceding page

5360

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLV NEW YORK, SATURDAY, MARCH 20, 1915 No. 12

Sensible Act of Omission

THE outgoing Congress, in refusing to be "Moon-struck" by the influence of the chairman of the house committee on post-offices and post roads, took a most sensible stand. We have commented before in these columns on the viciousness of the confiscatory rider relating to railroad mail pay attached to the post-office appropriation bill by the afore-mentioned chairman, Representative Moon, and we desire now only to compliment our national legislators upon their action. The last resort of the proponents of doubtful legislation is always to attach their proposals, if sufficiently germane to the subject to be legally permissible, to some bill, like an appropriation measure, that seems necessary of passage. Too often, in the rush of the closing hours of Congress, such a method has proved successful—which makes its failure in this case all the more commendable. Naturally it is a matter of regret to us that the post-office appropriation bill itself was killed, but the censure created thereby should be directed solely against the unseemly obstinacy of Mr. Moon and his associates in refusing to withdraw the rider in the face of widespread opposition. One would expect that after such a defeat Mr. Moon would realize the absurdity of his efforts, but this Congressman is of a most peculiar type. After due mental labor he has conceived the idea that railroad influences (not corrupt, as far as he is aware) brought about the failure of the bill, but thus far he has given not the slightest indication of any realization that Congress, in acting as it did, only expressed the constantly growing national disposition to treat common carriers more fairly.

❖

Old Steel Cars Easily Maintained

THE prominent feature of the article on steel car repair on the Long Island Railroad, published elsewhere in this issue, is that steel construction doesn't need real routine repairs. Steel cars have been in operation on this system for ten years, and that period is certainly long enough to show up any weaknesses which might be inherent in the steel construction. However, all that has been required for the maintenance during that period is a somewhat glorified tin shop in which only one new class of labor is necessitated by the new equipment. This is the structural ironworker, whose experience is largely confined to the handling of pneumatic tools and whose actual work is so infrequent that three skilled workmen are sufficient to care for the maintenance of the framing of some 600 large steel cars. Compared with the number of carpenters required for an equal number of wooden cars this figure is enlightening. As a matter of fact, it seems to be the case that any given repair job is somewhat more costly in steel than in wood, but where the steel car excels is in its ability to do without repairs except under the most extraordinary circumstances. Impacts that would practically demolish a wooden car are not necessarily even severe in the case of steel construction. This is clearly shown by the unusual photographs that have been reproduced in the article in question. The lighter blows which are, however, sufficiently severe and sufficiently frequent to make the upkeep of platform sills and draft rigging a burden with wooden construction, are not noticeable with steel. Summed up, the Long Island's long experience with steel cars constitutes an astonishingly strong argument in their behalf. Although the practice described is on a large railway the principles involved apply with equal force to a system of any size. With the increasing number of steel cars in city and interurban railway service electric railway companies will become used to them, and their proper methods of repair will not seem so complicated as they do now on roads where wooden cars have been used exclusively.

❖

Signal Maintenance and Reliability

JUDGED by the practice of the ordinary interurban line, the signal-maintenance methods of the New York, Westchester & Boston Railway, described elsewhere in this issue, provide for considerably more attention to the signal apparatus than is usual. Contrary to the common practice of assigning but one maintainer to a district and making him subject to calls, the Westchester organization gives continuous supervision by assigning a night man as well as a day man to each signal district, which contains roughly the equivalent of some forty signals. The low cost of approximately $2 per signal per month which is obtained is clearly due in the main to the limited territory that is covered (less than 9 route-miles for any district), the major part of the maintainer's time being put in on the interlocking plants. To this extent, of course, the physical work of signal maintenance on this line is made easy, but on the other hand, this facility is partly offset, from

the ordinary interurban road's standpoint, by the fact that practically all of the signals have two blades. It would seem, therefore, that increased supervision for signals, at least within certain limits, produces direct results, because the Westchester line's operating record of 20,000 signal movements per failure is far beyond the corresponding figure of 4000 or 5000 that may be expected on an interurban line. Still more important is the fact that, during the road's three years of operation, involving some 11,000,000 signal movements, no false-clear indication has occurred. Whether improved reliability of signals is worth additional expense for maintenance is, of course, a question of considerable magnitude, and it has to be decided on the merits of each particular case. But the fact seems to be clearly established that improved reliability is practicable if a railway company desires it and that it does not by any means involve a prohibitive expense.

The Labor Side of Maintenance

THE era of the well-lighted, well-ventilated, safe and otherwise generally attractive electric railway shop is at hand. A number of such shops have been described in recent issues of this paper and an account of another appears this week. Such surroundings are bound to be reflected in lower maintenance costs and in a better attitude of the workman toward his work. While these shops leave little to be desired in the way of comfort and facility, there is not apparent as yet in many shops a strong effort systematically to fit the workman for the use of these facilities. While it is true that electric railway maintenance work has peculiar requirements due to its general complexity, at the same time its variety would seem to be an advantage in developing all-round workmen.

The day of the old-fashioned apprentice system has passed, and nothing has yet taken its place. In electric railway shops the mechanics are drawn from all possible sources, having learned their trades usually in a very unsystematic fashion. Grown men, as a rule, are used as helpers as they are much more immediately useful. The work, particularly in large shops, is greatly subdivided, with numerous specialists in narrow lines. For example, in one extensive equipment department there are sixty-four named jobs, while in another there are forty-nine, a large proportion in both cases involving skilled labor. Fendersmiths and fender repairmen are separate specialists, as are gatesmiths, contact-shoe repairmen, acetylene welders, and so on. In the small shop individuals have somewhat varied work because there is not enough to do in one specialty, and they can pick up all-round skill of an uncertain kind.

While the shop man usually gets less money per day than equally-skilled workers in the building trades, his job is a steadier one, the conditions surrounding him are in many ways better, and he probably earns as much or more in the course of a year. The chief trouble is that there is so little opportunity for a boy to learn a trade, and in much of the work there does not seem to be any trade to learn. If jobs of a similar character could be grouped together so as to form trades, such as electrical equipment repairing and inspection, car machine work, car wiring and conduit fitting, motor repairing, etc., and if some simple apprentice plan could be devised by which boys could learn these, with or without trade-school training, certain apparent advantages would follow.

From the company's standpoint it would be advantageous to be able to shift men from one job to another, say from controller to trolley-base repair, so as to keep the force uniformly occupied. This in some cases would reduce the necessary size of the force. More general work would encourage ambitious boys to enter railway shop service because it would fit them to take jobs elsewhere if work became slack, while the variety would make them more efficient and intelligent workmen.

In the early days the trade guilds looked after the education and training of apprentices. In these times the burden appears to rest upon the employers.

Increased Maintenance Expenses

THE factors that influence operating expenses are many and varied according to the properties examined, but to a certain extent it is possible to generalize concerning this class of expenditures. The following remarks, based on the forthcoming census report for 1912, afford a general idea of the trend of electric railways in regard to a most important part of operating expenses—those for maintenance.

The total operating expenses of electric railways in this country from 1907 to 1912 increased 32.5 per cent, as compared to an increase in operating revenues of 35.7 per cent. On account of changes in accounting classification, not all of the five primary accounts are strictly comparable, but from the fact that maintenance of way and structures increased 62.6 per cent, maintenance of equipment 27.2 per cent, conducting transportation 34.4 per cent, and general and miscellaneous expenses 28 per cent, it is evident that the increase in the cost of maintenance, particularly for way and structures, was especially large. This fact is emphasized by the operating expense percentages based on the total operating revenues. In 1907 the primary operating expense accounts consumed the following percentages of the total operating revenues; maintenance of way and structures, 6.82 per cent; maintenance of equipment, 7.52 per cent; traffic expenses, 0.41 per cent; conducting transportation, 33.74 per cent; general and miscellaneous expenses, 10.12 per cent, and wages, etc., for electric service not before included, 1.47 per cent. In 1912, with the last item included under conducting transportation, the percentages were: maintenance of way and structures, 8.17 per cent; maintenance of equipment, 7.06 per cent; traffic expenses, 0.46 per cent; conducting transportation, 33.42 per cent, and general and miscellaneous expenses, 9.53 per cent.

The most striking facts shown by these figures are the large comparative decrease in the conducting transportation account, the smaller decreases in the general and the maintenance of equipment accounts and the

large increase in the maintenance of way and structure account. The operating ratio was 1.44 points less in 1912 than in 1907, but while the three accounts which decreased were lower by a total of 2.84 points, the two which were greater increased by 1.40 points, of which maintenance of way and structures accounted for 1.35 points. From this it must not be inferred that equipment maintenance was skimped during the five-year period. With generally adequate maintenance expenditures for each class of property, it is probable, and quite proper, that the greatest attention was paid to maintenance of way, for the better the track maintenance the less would be the expenses caused by the wear and tear on equipment.

Another interesting point that might be mentioned is the difference in maintenance expense ratios for railways of different sizes. The larger roads showed much larger percentages for maintenance of both way and structures and equipment than the smaller roads, with corresponding smaller percentages for the general and miscellaneous account and for the power subaccount in conducting transportation. It seems that economies in power expense and in the general costs of management accompany growth in size, and that with this there also comes more than relative increases in the amounts used in maintaining the property in an efficient operating state.

Coasting Recorders in New York

WE believe that some very important questions are answered by the results of coasting recorder practice on the Third Avenue Railway System, New York, as detailed elsewhere in this issue. Ever since this and other devices have been brought forward as a necessary means to correct and economical car operation, the electric railway manager has asked: How much will I save in my power bill? How can I judge my men fairly and what will a follow-up system cost? How will the change affect collisions? How will it affect the maintenance of equipment? These are the questions that are answered, in part at least, by experience with 1100 instruments used under a wide diversity of conditions by the New York railway, whose practice is described.

The saving in the energy requirements appears very clearly on the Third Avenue Railway, inasmuch as that company is billed by the central station company with so many kilowatt-hours a month. As we have said lately in our discussions of recording devices for rating the efficiency of motormen, railways that buy energy see the savings of scientific car operation more directly than those which have their own power plants. The Third Avenue figures show a maximum saving of 10 per cent with 83 per cent of the cars equipped with coasting recorders, which corresponds to an indicated saving of 12 per cent with 100 per cent of the cars so equipped.

With the excellent follow-up and educational system that is used by the company, there is every reason to believe that 12 per cent will be exceeded. It should be emphasized here that when the energy requirements for the same months of succeeding years are checked against each other, only the periods covering mild or warm weather may be compared fairly. Otherwise a most unjust conclusion would be drawn from a comparison of the figures for December, 1913 and 1914. As the table shows, the mean temperature in December, 1914, was 32 deg. Fahr., or 7 deg. less than in December, 1913. This greater degree of cold necessitated so much more energy for heating purposes as to absorb the savings that otherwise would have been made by coasting. Seen from another angle, the reduction due to coasting almost offset the addition due to extra heating.

The fair judgment of the motormen is even more important than any saving in energy. The device put on the car must be placed before them in the guise of something that will help them to run a car with the pride of the artisan instead of the indifference of the laborer. And since conditions on no two lines, or even on the same line, are alike, a thorough classification is necessary before men can be judged on a percentage basis. The device itself should show readings that are readily understood by the motorman so that he can anticipate, in a measure, what his record for a given run ought to show. The interest that the Third Avenue men have in reading the coaster tape is not unlike that which the broker has in a ticker tape. We have already outlined in these columns the need for proper classification. Its importance is recognized on the Third Avenue road, for we find that the men are not only divided as to lines but subdivided as to character of run and still further subdivided as to the number of service days per month. Yet all this detail costs but 1.1 cents per man per diem. On a smaller road the cost would probably be greater, but, on the other hand, the company with the smaller energy needs would save more per kilowatt-hour, since it has to pay more for power.

Since some skepticism has been shown with regard to run-down accidents under increased coasting, the collision figures should also be convincing. These, for the period mentioned in the article, show a reduction of 20 per cent. Last is the question of the effect of coasting on the car equipment. Here the follow-up system is of value in checking the men who are doing suspiciously well. Furthermore, all the motormen may be trusted to complain about the "stiff joints" of a car if it does not give the coasting percentages expected. At any rate, the figures on car electrical equipment presented in the article do not bear out the opinions of the pessimist as to increased electrical troubles.

To sum up the lesson of the Third Avenue Railway's work with the coasting recorder: A checking device for use on a car cannot be bought as a piece of mere merchandise and be left to revolutionize car operation unaided. It must be regarded as a tool with which a staff properly organized can analyze men and methods to the end that the railway may be operated with precision in service, economy in energy, care in equipment and justice to the motorman.

FROM A.C. TO D.C. IN THE NIGHT

A Successful Conversion from 6600-Volt Single-Phase to 1200-Volt D. C. Operation Without Interruption of Service—Unit Costs and Descriptions of Special Features, Including Center-Entrance Cars

THE Annapolis Short Line is a strictly interurban railway, as it has no city track connections at either of its terminals. It runs between Annapolis and Baltimore, Md., a distance of 25.3 miles, its total trackage as single track being 32.3 miles. The Annapolis terminal is adjacent to the general offices and shops of the company in the center of the city and near all state buildings, while the Baltimore passenger terminal is at Camden station, the main passenger station of the Baltimore & Ohio Railroad, and three blocks from the heart of the business section. The company also has a separate freight-handling terminal in Baltimore.

This property began operation in 1886 as a steam railroad; in May, 1908, it was electrified for 6600 volts, twenty-five cycles, single phase, and in January, 1914, the present 1200-volt d.c. installation was completed for service. Since June 1, 1912, the property has been under the management of Allen & Peck, Inc., with T. C. Cherry as local manager and David E. Crouse as electrical engineer.

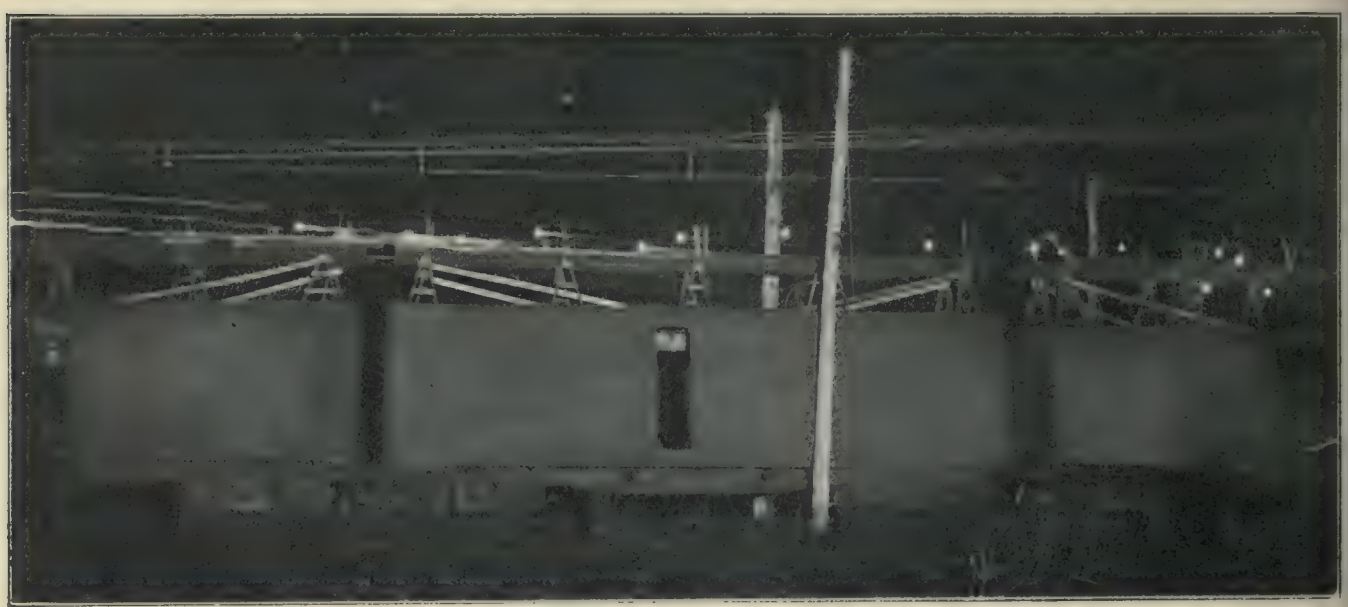
The first electrical equipment had been built for a.c.-d.c. operations, but in practice the railway, running as it did over private right-of-way throughout, operated only on alternating current. The Annapolis Short Line was, therefore, in the unenviable position of using apparatus more complex and heavier than necessary, aside from any questions of efficient use of energy and reliability in operation.

One particularly notable improvement which has followed the change to 1200 volts direct current is a reduction in the weight of the electrical equipment per car from 33,175 lb. to 18,920 lb.

Following the advent of the new management a study was made of the situation with the result that 1200-volt equipment was decided upon. The care with which this study was undertaken could not be better shown than by the following table, which presents the last a.c., the estimated d.c. and the actual d.c. operating costs per car-mile:

	A.C. Cost 6 Months July 1 to Dec. 31, 1912	Allen & Peck, Inc., Estimate of D. C. Cost	Actual D.C. Cost July 1 to Sept. 30, 1914
Way and structure	$0.0401	$0.0270	$0.0383
Equipment	0.0375	0.0160	0.0118
Traffic	0.0081	0.0100	0.0080
Transportation	0.1563	0.1060	0.1159
General	0.0781	0.0740	0.0594
Total	$0.3201	$0.2330	$0.2334

The foregoing classification follows the I.C.C. plan in which traffic is understood to include solicitation, superintendence and advertising, while transportation includes motive power.



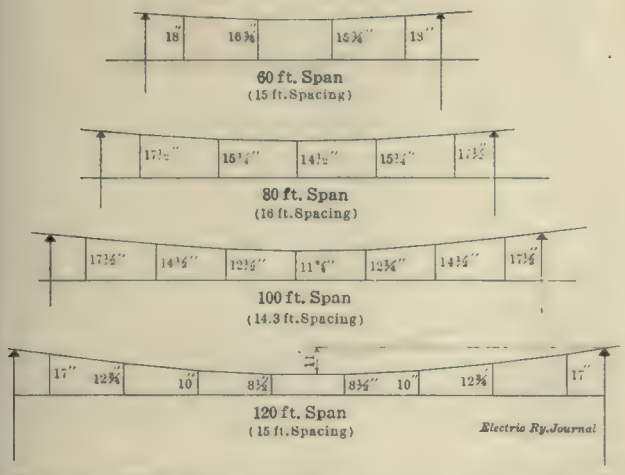
ANNAPOLIS SHORT LINE—NIGHT VIEW OF THE ERECTING PLATFORM FROM WHICH TWO 120-FT. SPANS OF CATENARY WERE CHANGED FROM A.C. TO D.C. DISTRIBUTION AT ONE TIME

Planning and Carrying Out the Work

A most striking feature of the change-over from 6600 volts a.c. to 1200 volts d.c. was that the work had to be done between 1 a. m. and 5 a.m. and left in such shape that operation during the following day would not be interfered with in any way. Another even more striking feature was the care with which every step of the work was planned in advance.

The work was laid out in the following fashion:

First, a chart, Table I, was made, showing every pole number and the spacing between these poles as numbered. Then the numbers of hangers of given lengths for each span were tabulated and laid out, as shown in Table II and the accompanying drawing. A detailed tabulation was also made of the steady sticks required at each station, as included in Table I.



ANNAPOLIS SHORT LINE—CATENARY LINE CONSTRUCTION SHOWING HANGER SPACINGS

To follow up the work the management used a progress chart which showed every pole and the length of every span. As the steel trolley was run a red crayon line was drawn vertically between the poles so equipped, a white crayon was drawn to show the progress of feeder wire, a pink crayon line the progress of the transmission and a yellow line the progress of bonding. The date was written alongside each section. In Table III different styles of lines replace the colors.

TABLE I—TROLLEY AND TRANSMISSION POLES, ETC., ANNAPOLIS TO BALTIMORE

Miles	Station	—North Bound— Pole No.	No. Steady Sticks	—South Bound— Pole No.	No. Steady Sticks	
0	Annapolis	0				Single track.
			32			
0.7	West Annapolis	44				Single track.
			25			
1.4	Wardour	77				Single track.
			16			
1.73	Severn Draw	93				Single track.
			6			
1.9	Severn Side	100				Single track.
			41			
2.9	Winchester	151				Single track.
			29			
3.9	Arnolds'	201		204		Double track.
			16		15	
4.5	Joyce Station	227		227		Double track.
			32		24	
5.3	Revels'	272		236		Double track.
			41			
6.3	Jones' Station	323				Single track.
			25			
7.2	Round Bay	367				Single track.
			12			
7.8	Boone	390				Single track.
			18			
8.3	Robinson	418				Single rack
			56			
9.9	Earleigh Heights	491				Single track.
			32			
10.4	Pasadena	541				Single track.
			40			
11.8	Elvaton	581		585		Double track.
			41		46	
13.3	Marley	647		664		Double track.
			53			
14.8	Saunders' Range	722				Single track.
			26			
15 4	Glen Burnie	764				Single track.
			46			
17.1	Wellham	841				Single track.
			31			
17 9	Woodlawn	882				Single track.
			18			
18.4	Shipley	907				Single track.
			19			
18.9	Linthicum	934				Single track.
			43			
19 9	Pumphrey	983				Single track
			46			
20 95	Powder house	1033		1033		Double track.
21.2	Baltimore Highlands	1044	30		40	Double track.
22 0	Cliffords	1985		1085		Double track.
			33		31	
22.9	Fish House Tower	1131		1131		Double track.
23.25	Westport Power House	1152	24	1152	20	Double track.
23 39	Westport Tower	1166		1160		Single track.
				1175		
			30		30	
24.45	B. & O. (Russell St.)	1224		1216		Double track
			42			
25.3	Balto. (Camden Sta.)	1277				Single track.
	Total	903		Total	206	

1109 Steady Sticks.

TABLE II—CATENARY LINE CONSTRUCTION SHOWING NUMBER OF HANGERS ORDERED

No. Spans	Length Span, Ft.	Hangers Length, In.	No. Hangers Needed	No. Hangers Extra	Total No. Hangers
891	120	17	891	14	905
	120	12¾	891	12	903
	120	10	891	12	903
	120	8½	891	12	903
	120	8½	891	12	903
	120	10	891	12	903
	120	12¾	891	12	903
	120	17	891	12	903
373	100	17½	373	9	382
	100	14½	373	8	381
	100	12¼	373	8	381
	100	11¾	373	14	387
	100	12¼	373	8	381
	100	14½	373	8	381
	100	17½	373	18	167
149	80	17½	149	9	382
	80	15¼	149	16	165
	80	14½	149	32	181
	80	15¼	149	16	165
	80	17½	149	18	167
158	60	18	158	31	189
	60	16¾	158	30	188
	60	16¾	158	30	188
	60	18	158	31	189
Totals 1571			11,116	384	11,500

The work of conversion was begun on Oct. 12, 1913, and completed on Jan. 4, 1914, in time for the opening of the Legislature at Annapolis.

The work gangs operated with two steam locomotives. One of these hauled the reels from which the steel wire was strung and secured to the passenger with tie wires; the other locomotive hauled six freight cars, on the top of which a continuous platform equal to two pole spans in length was erected. The men on this train removed the old hangers and installed the new ones. The speed of the work was high owing to the fact that the supply man had a chart which showed him just what length and number of hangers were needed step by step.

As the line, of course, was dead during these operations light had to be obtained from an outside source. This light was therefore generated from a gasoline-electric set mounted in one of the freight cars, as illustrated. Part of the bonding was also done at night with a machine of the Electric Welding Improvement Company.

CHANGES IN THE TROLLEY AND FEEDER LINE

The original trolley line was a bracket type catenary with wooden strains or steady sticks for the alignment of the trolley on every pole at curves and at every other pole on tangents. The poles on tangents were spaced 120 ft. and on curves from 100 ft. down to 60 ft. The messenger was of 7/16-in. Siemens-Martin steel, the hangers were of ¼-in. solid pipe spaced 10 ft. and the trolley was of No. 000 grooved copper.

TABLE III—PROGRESS CHART OF EACH STYLE OF LINE, INDICATING KIND OF WORK DONE

Station	Pole No.	Length Span North Bound	Length Span South Bound	Station	Pole No.	Length Span North Bound	Length Span South Bound
Marley 13.3 mi.	642	120	120	Glen Burnie 15.4 mi.	771	80	
	643	120	120		772	100	
	644	120	120		773	100	
	645				774	120	
	646	120	120		775	120	
	647	120	120		776	120	
	648	100	100		777	120	
	649	100	100		778	120	
	650	120	120		779	120	
	651	120	120		780	120	
	652	120	120		781	120	
	653	120	120		782	120	

Nov. 11 — Nov. 11 — Nov. 11 — Nov. 12 — Nov. 13 — Nov. 13 — Dec. 9, 1913 — Dec. 10 — Dec. 11 — Dec. 11

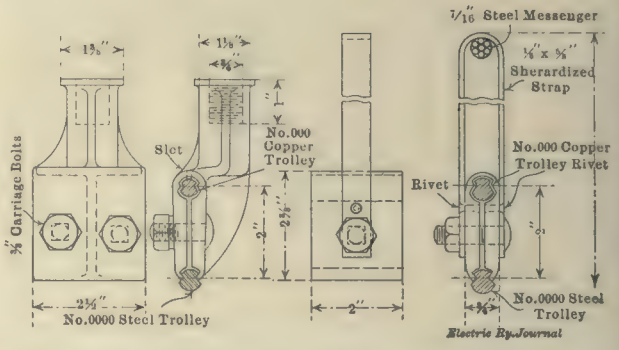
In examining the line for the forthcoming operation at 1200 volts d.c. it was found that five to six years' operation of 3,313,314 car-miles at 6600 volts with sliding pantographs had worn down the copper to about 50 per cent of its original section. Experience indicated the desirability of using a steel contact wire while retaining the conductivity advantage of copper, but the old wire was evidently too weak to carry a second wire together with the necessary clips. The new double-galvanized steel wire, which is of No. 0000 size, is therefore carried directly from the messenger by means of hangers spaced 15 ft. apart.

The new hanger comprises a standard malleable iron duplex clamp with a full loop of ¾-in. x ⅛-in. strap over the messenger. This type of hanger gives a smooth under-running wire for the pantograph. One hanger in each span is of bronze in order to secure a good bond between the present steel contact and original trolley wire. The special clip, shown in an accompanying drawing alongside the hanger, was installed at the ends of the steady sticks to take care of the double wire.

One mile of the steel construction described was tried out for a year before the entire line was equipped. This installation was the first on a d.c. railway to show that a sliding steel shoe could collect ample current from a steel wire for cars of the weight and speed suitable for high-class interurban service. This change accomplished the object of transferring the faster rate of wear to the easily-renewed pantograph shoe for, after two and one-half year's operation of 863,903 car-miles, the wear on the original steel wire is but 0.002 in. The slight flattening from wear actually is advantageous in promoting the life of the pantograph shoe.

The addition of the steel contact wire reduced the clearance to the head of the rails by 2 in., making the present figure 21 ft. 10 in. The relative position of the messenger was not changed except in taking up the slack due to the extra weight of the steel trolley wire. A few additional anchors were placed in the line to keep the trolley from running out.

The insulators of the original line were retained, as they were to be applied to a lower voltage. The a.c. arresters were also retained except that their gaps were cut down from ¾ in. to ¼ in. These arresters have a fuse in circuit with a tripping device which opens the circuit mechanically and blows the fuse. A few Garton-Daniels 1200-volt d.c. arresters, General Electric ME and Westinghouse arresters are also in use. The



ANNAPOLIS SHORT LINE—STEADY STRAIN TROLLEY CLAMP AND RECONSTRUCTED CATENARY SUSPENSION

arresters are installed at every other feed tap. The latter are located about 1000 ft. apart. The section breaks installed in the trolley every 5 miles are of the original hickory design.

The alignment of the trolley wire was changed to come over the center of the trucks instead of the center line of the car.

An aluminum feeder of 477,000 circ. mil between Westport and Annapolis is the only addition to the low-tension system outside of the trolley suspension itself. This fact is of significance since it shows the difference in distribution efficiency existing between 6600-volt a.c. and 1200-volt d.c. on a 25-mile interurban road with no change in substation location. Roughly speaking, the distribution circuit as originally built had about 64 per cent less conductivity than the present combination of old copper trolley, new steel trolley and aluminum feeder.

The steady sticks would not serve as originally mounted owing to their lack of clearance. A longer shank was, therefore, needed on the hanger to get sufficient distance between the messenger and trolley and to enable the steady stick to be mounted at an angle that would give 8 in. clearance from the pantograph horn in a vertical plane. The steady stick brackets are now made for horizontal as well as vertical swiveling of the stick, thus eliminating stick breakage.

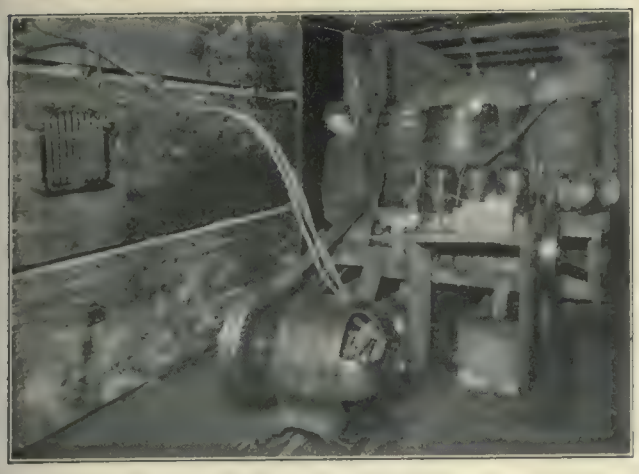
With 6600-volt a.c. operation the cars coasted with lowered pantograph over the crossings with 600-volt



ANNAPOLIS SHORT LINE—BRAZING BONDS AT NIGHT DURING THE CHANGE-OVER PERIOD



ANNAPOLIS SHORT LINE—PREPARING TO WORK FROM FREIGHT CAR PLATFORM AT NIGHT



ANNAPOLIS SHORT LINE—GAS-ELECTRIC CAR SUPPLYING LIGHTING CURRENT FOR THE NIGHT RECONSTRUCTION

lines near Baltimore at speeds as high as 25 m.p.h. Now the crossing is so arranged that for a distance of 50 ft. on each side of the intersection 600 volts is used instead of 1200 volts. The cars, therefore, go over with all lights burning and at half speed but under full control and with no danger of stalling at the crossing. Two accompanying illustrations show how the respective trolley wires of the interurban and city cars were made to permit the riding of the trolley wheel across the bronze strip of the interurban.

COSTS OF FEEDER, CATENARY AND SUBSTATION

The cost on a unit basis of the feeder and catenary work follows, all as per the detailed bills of material reproduced, as in Table IV.

Cost of 477,000 circ.-mil aluminum cable, 23.5 miles: Material, $16,790.78, or $714.20 per mile; labor, $2,516.59, or $107.40 per mile; total, $19,307.37, or $821.60 per mile.

Cost of No. 0000 grooved steel galvanized trolley, 32 miles of track: Material, $13,543.01, or $423.22 per mile; labor, $5,760.22, or $180 per mile; total, $19,303.23, or $603.22 per mile.

Cost of bonding No. 0000 7-in. EU-5 electric weld, 32.25 miles of track, 10,500 joints: Material, $6,680.03, or $207.13 per mile; labor, $2,390.58, or $74.12 per mile. Including the bonding car the cost per joint was as follows: Material, 63 cents; labor, 23 cents; total, 86 cents. Excluding the bonding car, the cost was as follows: Material, 39 cents; labor, 23 cents; total, 62 cents. The incidentals in connection with the catenary feeder and transmission job (noted later) are as shown in Table V.

TABLE IV—BILL OF MATERIAL FOR CATENARY.

32	Miles No. 0000 Grooved steel double galvanized trolley wire.
1200	Steady stick clamps.
34	Splicing ears.
50	Feed-in clamps.
100	Steady sticks.
	120-ft. Span.
1862	Length 8½-in. duplex catenary hangers.
1862	Length 10-in. duplex catenary hangers.
1862	Length 12¾-in. duplex catenary hangers.
1862	Length 17-in. duplex catenary hangers.
	100-ft. Span.
357	Length 11¾-in. duplex catenary hangers.
714	Length 12¼-in. duplex catenary hangers.
714	Length 14½-in. duplex catenary hangers.
714	Length 17½-in. duplex catenary hangers.
	80-ft. Span.
186	Length 14½-in. duplex catenary hangers.
372	Length 15¼-in. duplex catenary hangers.
372	Length 17½-in. duplex catenary hangers.
	60-ft. Span.
188	Length 16¾-in. duplex catenary hangers.
188	Length 18-in. duplex catenary hangers.

BILL OF MATERIAL FOR FEEDER

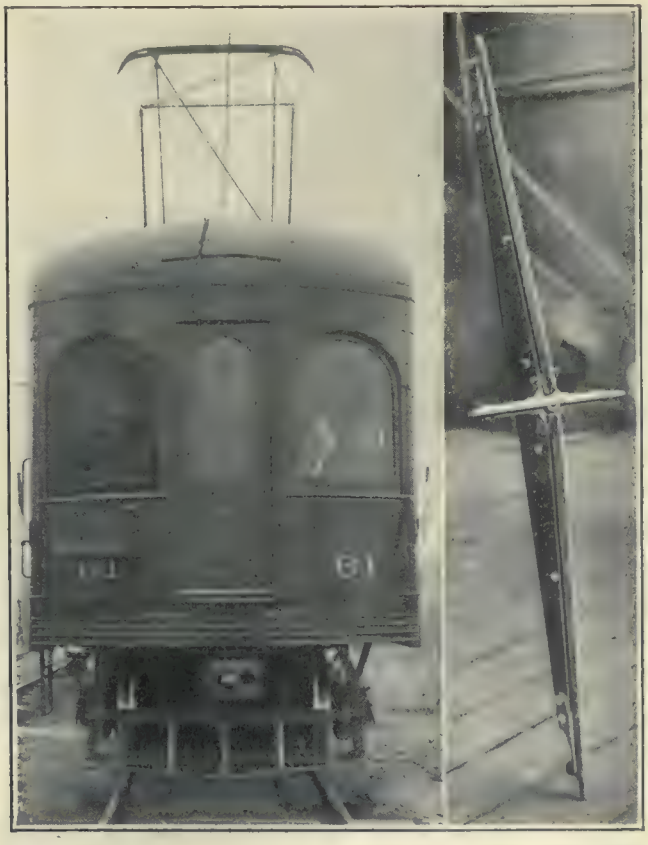
23.5	Miles nineteen-strand feeder cable 477,000 circ. mils.
1170	Feed wire insulators.
1170	Iron side brackets.
3600	½-in. x 4-in. Lag screws.
	Three-piece compressing joints.
6	Extra dowel pins.
2	Eye bolts.
47	Parallel grooved feeder taps.
5	Compression dead ends.
1	Hydraulic press with dies.
12	Single piece compressing joints.
	No. 2 tie wire for feeder.

TABLE V—TYPICAL TOTAL COST STATEMENT

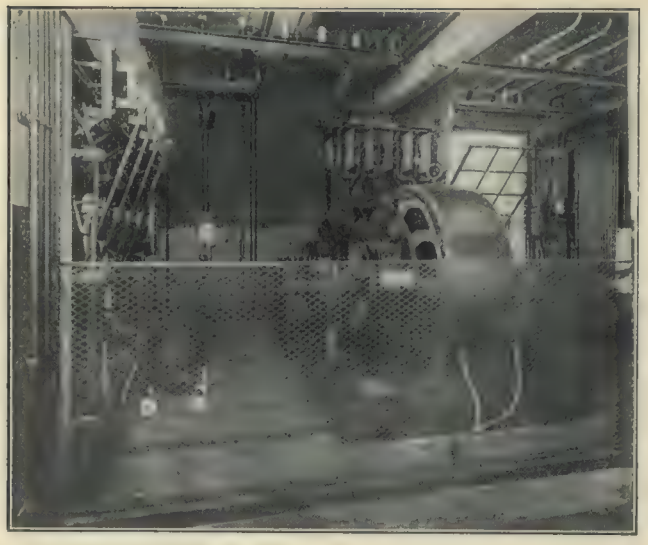
	25.3 Miles	Per Mile
Job No. 111	$2,454.95	$97.03
Labor	1,911.05	75.53
Material	543.90	21.49
Liability insurance	177.17	7.00
Engine rental	172.62	6.82
Drafting material	113.72	4.49
Casualties	54.79	2.16
Law	15.00	0.59
Telephone calls	10.60	0.41



ANNAPOLIS SHORT LINE—SHOWING SUSPENSION AT CROSSING OF 1200-VOLT AND 600-VOLT LINES



ANNAPOLIS SHORT LINE—OBSERVATION END OF CAR; 1200-600-VOLT CROSSING PIECE



ANNAPOLIS SHORT LINE—INTERIOR OF SUBSTATION AT WESTPORT

The original substation spacing has been retained for operating reasons. For example, the Westport station near Baltimore is cut out at night so that the entire load may be carried from Jones substation. The Westport substation is located 1.5 miles from Baltimore at the power house of the Consolidated Gas, Electric Light & Power Company, from which this company purchases electric energy. The Jones substation is 17.5 miles from Westport and 6.3 miles from Annapolis.

The Jones substation, which was constructed in 1914, is a one-story structure built up of 13-in. brick walls on a concrete foundation and with a concrete and three-ply asbestos roof. Its over-all dimensions are as follows: Length, 45 ft. 2 in.; width, 30 ft. 8 in., and height from ground line, 20 ft. 6 in. The present equipment in this station consists of two 300-kw oil-insulated self-cooled transformers, 13,200 volt primary 765 volts secondary three-phase twenty-five cycles; two 300-kw rotary converters with 1200-volt d.c. side; low-equivalent type lightning arresters for the 13,200-volt lines; electrolytic arresters for the 1200-volt d.c. feeders; hand-operated oil switches and two 25-kw 13,000/6600-volt transformers. The latter are used for supply lines to the shops and for an accommodation lighting and power service to a few small towns along the right-of-way.

A number of interesting features of the Jones substation will be noted from the accompanying drawings and other illustrations. In the first place it will be seen that the station is large enough for a third main transformer and rotary. A prime feature in the design was to keep the incoming high-tension and the outgoing low-tension lines as far apart as possible. The a.c. lines come in at one corner to the oil switches, whence they drop from the switching gallery to the transformers beneath, passing from the transformers via fiber conduits to a tunnel which extends under the rotaries. The d.c. feeders pass from this tunnel to the busbars and thence go out at the opposite corner of the station.

Owing to the layout described the starting panels had to be placed between the transformer and rotary instead of on the switchboard.

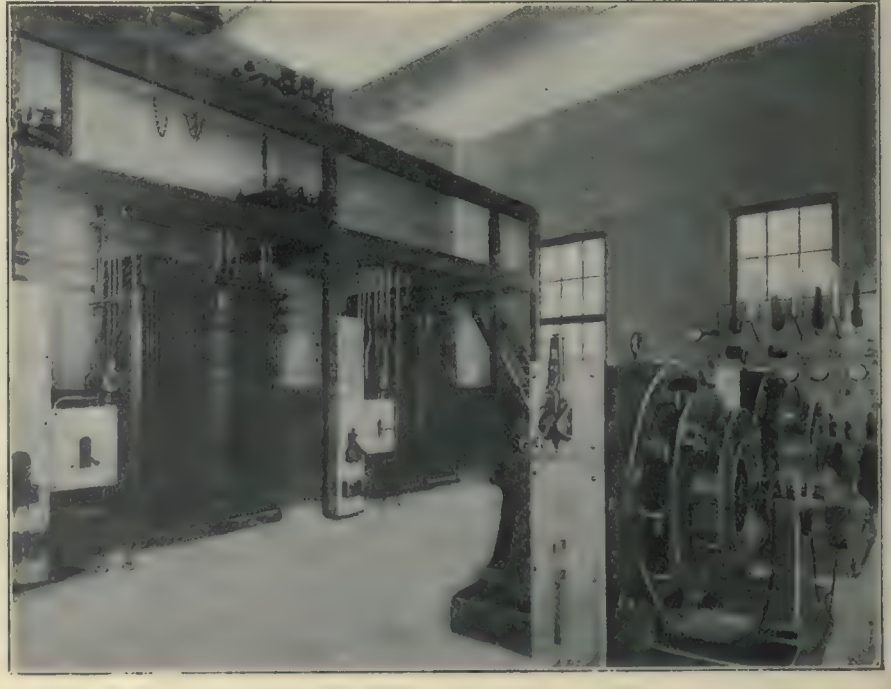
In operating this station at first some annoying flashovers occurred on the rotaries. These have been minimized by moving the feeder taps which are nearest the station to a distance of 2 miles instead of 1 mile. The frames of the rotaries were also insulated by placing treated hardwood bases below them and connecting the frames to ground through high resistance. Another safety feature is the provision of an oil drain for the transformers as a guard against fire. This drain takes the form of a brick gutter in the floor.

To start a machine, the operator closes the high-tension oil switch which has manually-operated remote control connection to the gallery. Next he throws the starting switch to a position which will give half voltage on the rotary. While doing this he stands at a place, as illustrated, from which he can see a voltmeter on the swinging arm of the switchboard to determine the polarity. If the polarity is wrong he corrects it with the field break-up switch, then throws the starting switch to the full voltage position and finally closes the negative switch on the panel at the machine.

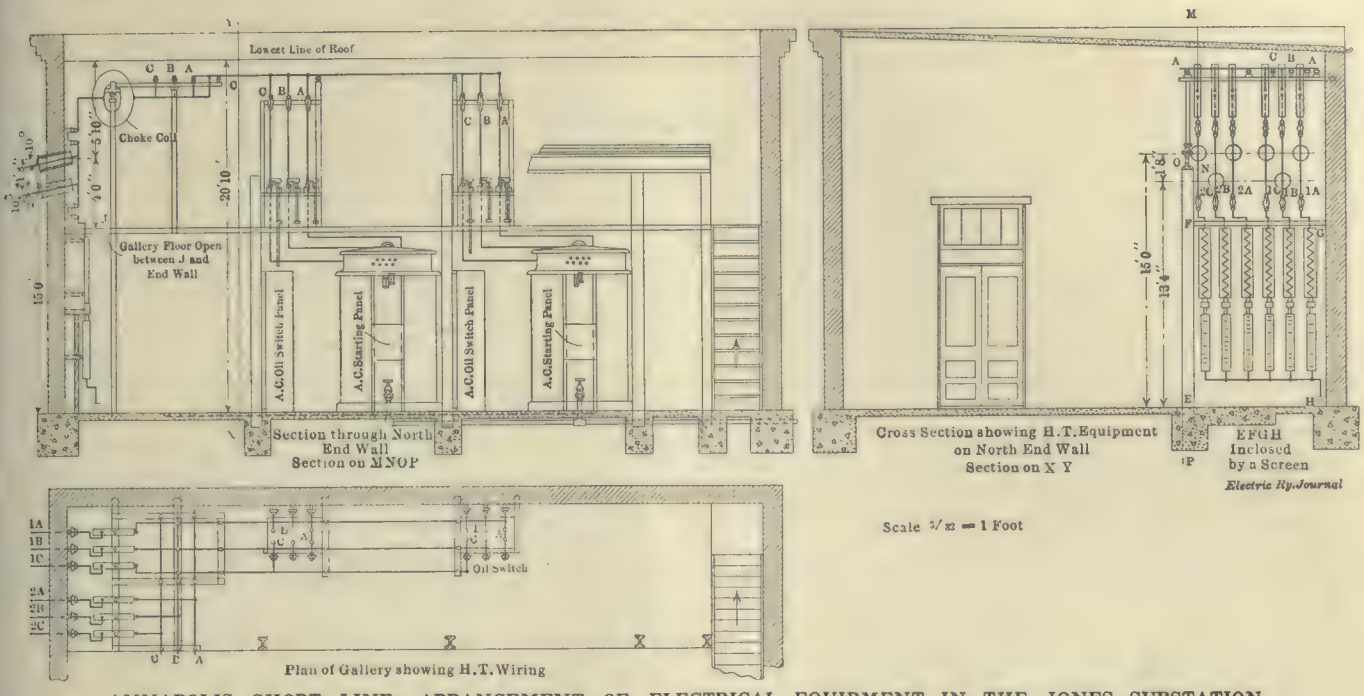
The total cost of the Jones substation, inclusive of land costing $200, was $5,430.49, or $6.03 per kw on the basis of 900-kw capacity. The cost of the land and material was $3,435.19, or $3.81 per kw, and of labor $1,995.30, or $2.22 per kw. This cost included the main busbar structure, conduit and all fixtures inside and outside the substation, but did not include apparatus or conducting material. The gallery erected for the high-tension switching apparatus is supported on one of the two rows of steel columns which carry a track for a 10-ton Maris crane.

The apparatus in the Westport substation is a duplicate of the Jones installation except that the oil switches are electrically operated and that there are no auxiliary transformers. The reasons for electrical operation of switches here are the facts that the power company's apparatus is of that type and that the switches are much further from the operator.

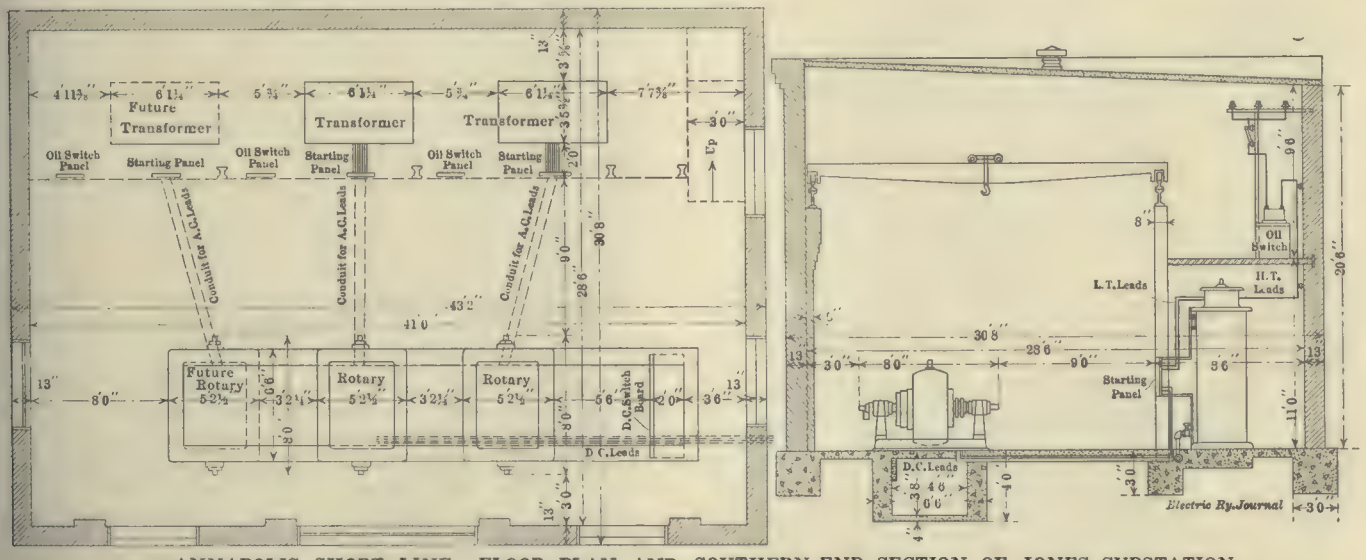
An unusually interesting log sheet is prepared daily by the operators at the Jones substation. In addition to the reports of interruptions, transformer tempera-



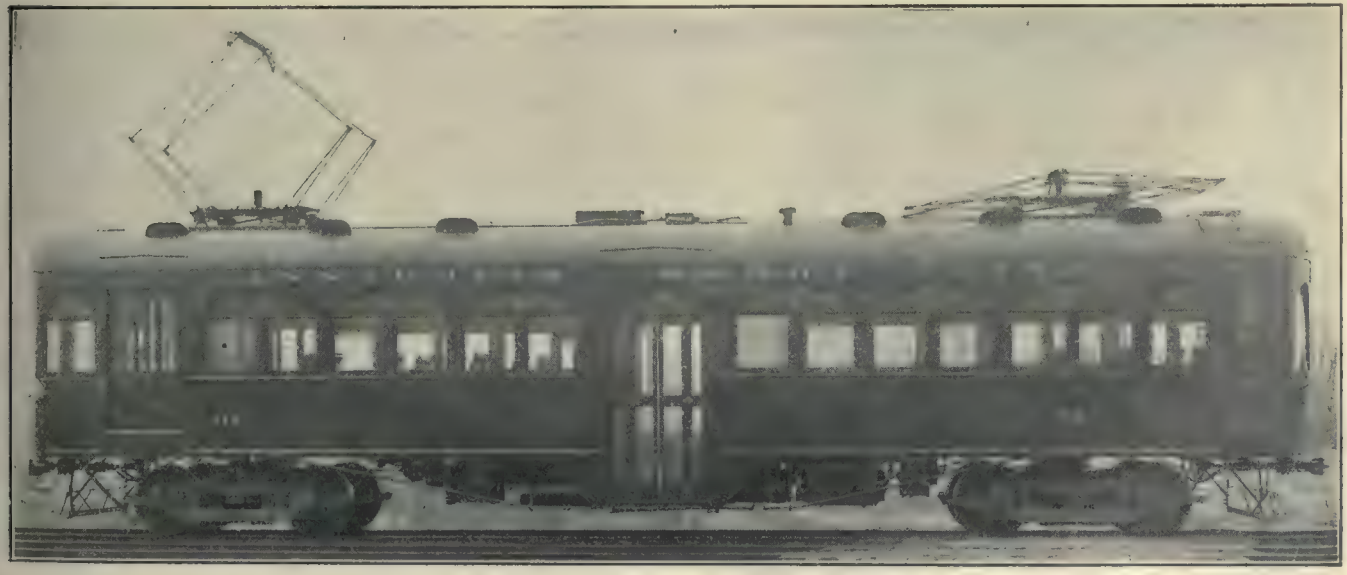
ANNAPOLIS SHORT LINE—INTERIOR OF SUBSTATION AT JONES, SHOWING HIGH-TENSION EQUIPMENT; SWITCHBOARD BEHIND ROTARIES



ANNAPOLIS SHORT LINE—ARRANGEMENT OF ELECTRICAL EQUIPMENT IN THE JONES SUBSTATION



ANNAPOLIS SHORT LINE—FLOOR PLAN AND SOUTHERN-END SECTION OF JONES SUBSTATION



ANNAPOLIS SHORT LINE—CENTER-ENTRANCE CAR WHICH WAS ADOPTED FOR THE 1200-VOLT SERVICE TO GET GREATEST CAPACITY AND QUICK INTERCHANGE OF PASSENGERS

TABLE VI—MONTHLY POWER RECORD, ANNAPOLIS SHORT LINE

1914 Month	Car-Miles	A. C. Kw-Hr. Purchases	Less A. C. Kw-Hr. Disposed of	D. C. Jones	D. C. Westport	D. C. Total	A. C. and D. C. Effic.	A. C. Kw-Hr. per Car-Mile	D. C. Kw-Hr. per Car-Mile	Stops	Aver. Mean Length Run	D. C. Watt-Hr. per Ton-Mile	A. C. Watt-Hr. per Ton-Mile
Nov.	60,283	268,440	262,478	125,980	110,660	236,640	90	4.35	3.91	20,512	2.9	97	108
Dec.	59,425	262,410	255,609	124,980	109,160	234,140	91	4.30	3.91	20,472	2.9	97	107

TABLE VII—TYPICAL HEADS OF TWO DAILY POWER RECORD CARDS

Jan. 1	Hour Peaks in Kw-Hr.	Reading of A. C. Watt-Meter	Total Kw-Hr.	Car-Miles	Kw-Hr. per Car-Mile	Stops	Mean Length of Run-Miles	Watt-Hour per Ton Mile
	580-560-640-340	123,864	8220	1907	4.31	589	3.2	107

Jan. 1	Westport D.-C. Read.	Kw-Hr.	Jones D. C. Read.	Kw-Hr.	Total A. C. Kw-Hr.	Power Line Reading	A. C. Kw-Hr.	Total A. C. to D. C. Kw-Hr.	Total D. C. Kw-Hr.	Effic.
	152,830	3440	358,710	3720	8390	29,750	170	8220	7160	89 per cent

tures, power readings and defects, individual and combined graphs are made up in the manner illustrated. The top of the sheet shows a curve of total a.c. kilowatt-hour peaks at Westport, the power-purchasing point, superimposed on a curve of total a.c. load in kilowatt-hours. Below these are shown pairs of curves comparing the d.c. load and d.c. capacity of each substation, then follows a graph showing the loss in transmission and conversion, and finally the graphs representing the working periods of the different rotaries.

TABLE VIII—BILL OF MATERIAL FOR TRANSMISSION

35 Miles seven-strand aluminum transmission wire No. 0. McIntire joints.
1 set McIntire twisting clamps.
6 Aluminum tap-off joints.
Aluminum tie wire No. 2.
850 6-ft. cross arms, 3¼ in. x 4¼ in.
1700 28-in. braces.
400 14-in. bolts.
200 16-in. bolts.
800 14-in. bolt washers.
400 16-in. bolt washers.
1700 ⅝-in. x 5-in. bolts.
1700 ⅝-in. x 5-in. bolt washers.
850 ½-in. x 3-in. lag screws.
1686 Transmission insulators.
1686 Transmission insulator pins.

The records of the individual substations comparing load and capacity are of value to the operators in showing them how efficiently they are using their rotaries to secure good machine load factors.

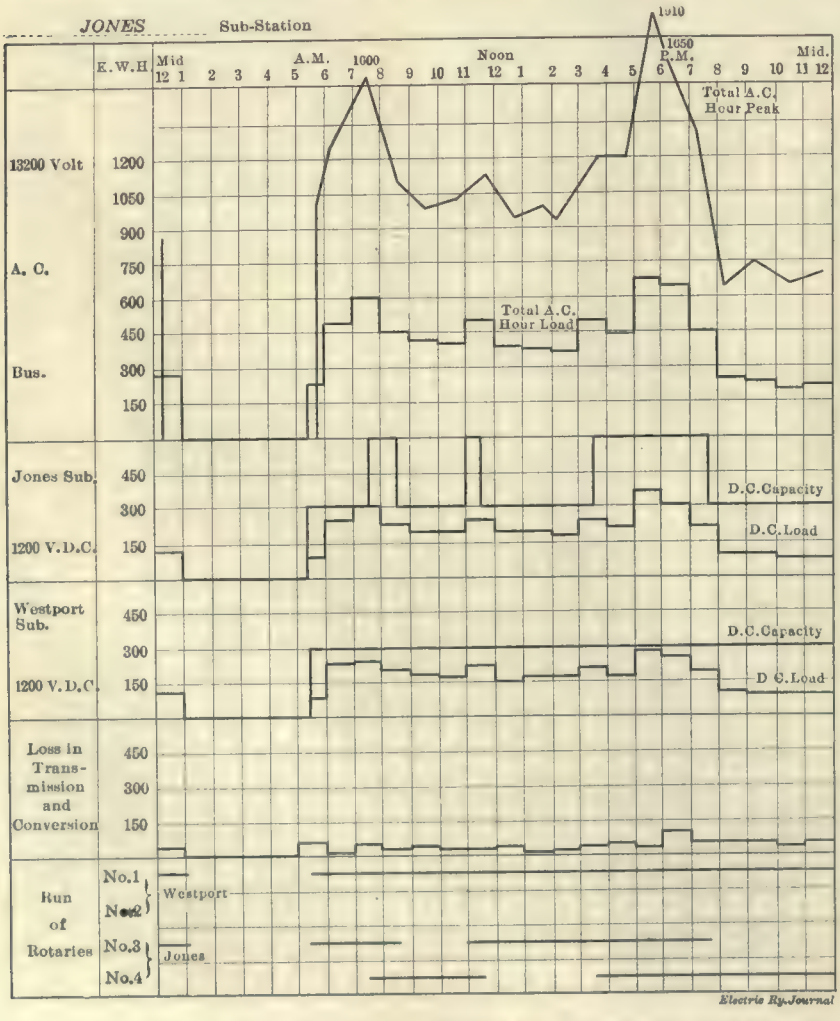
The efficiency of conversion from alternating current to direct current is very high, ranging from 90 per cent to 92 per cent. For example, the following estimated performance of transmission and guaranteed efficiency of apparatus at the Jones and Westport substations was made on the record of energy consumption obtained for the months of July, August, September and October, 1914, appear in Table IX:

TABLE IX—ESTIMATED EFFICIENCY, TRANSMISSION, 98 PER CENT

Westinghouse Company's guaranteed efficiency—Jones
Lowering transformers 97.5 per cent
Rotary converters 94.0 per cent
Total a. c. to d. c.....89.9 per cent

Westinghouse Company's guaranteed efficiency—Westport
Lowering transformers 97.5 per cent
Rotary converters 94.0 per cent
Total a. c. to d. c.....91.6 per cent*

*No transmission allowance required.



ANNAPOLIS SHORT LINE—GRAPHIC PORTION OF SUBSTATION LOG SHEET

The Westinghouse efficiencies given for apparatus were equalled in service due to the very good machine-load factor. The average load factor at each substation was 55 per cent. The power record, which is presented in Table VI on this page, shows how closely the watt-hours per ton-mile follow the average mean length of run, that is to say, when proper allowance is made for stops. These figures were obtained before coasting instructions and ampere-hour meters were introduced with beneficial results.

Power data from the substation log sheets and other sources are recorded daily on cards which are ruled for half a month. Typical heads of the two cards used and actual figures for the first day of this year are shown in Table VII near the top of this page.

TRANSMISSION SYSTEM

As the Westport substation is located in the plant of the power-selling company, the transmisson lines extend only for the 17.5 miles between Westport and Jones. The original transmission system comprised two single-phase lines of No. 2 copper mounted on one cross-arm. To make the same pole line carry the present three-phase system in duplicate a cross-arm for two wires was added below the original arm and wires. Each of the new transmission circuits is of No. 0 (105,530 circ. mil) steel-cored aluminum wire, the size being the equivalent of No. 2 copper and the coring permitting approximately the same sag as copper. The wires are mounted in triangular arrange-

ment on 35,000-volt O.B. porcelain insulators. The iron grounding wire for lightning protection is mounted on the top of the poles and is grounded to the rails every tenth pole, equivalent to a distance of 1200 ft. Telephone interference is minimized by giving each wire two complete turns in the 17.5 miles of run.

The cost of changing over the transmission system was as follows: For materials covering 35 miles of new aluminum wire, or 17.5 miles of track, $8,913.68; for labor, $3,024.85. The bill of material is presented in Table VIII on page 548. In considering labor cost it should be remembered that the work was done at night.

ROLLING STOCK

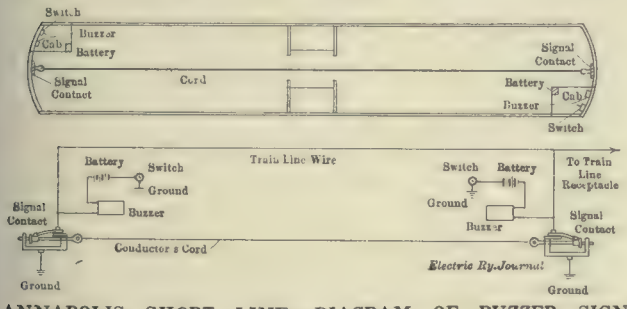
The original rolling stock was of the usual end-platform type and of heavy wooden construction, some with steel underframes. In changing over the line it was felt that much of the benefit would go unappreciated by the public if there was no apparent improvement in the cars. The management decided that in the first place new cars of all-steel construction should be used, in the second, that they should be lighter than the a.c. cars and, finally, that they should be of center-entrance type.

As the accompanying plan shows, the center-entrance car is divided into a main compartment, toilet and motorman's cab on one side, and into a smoking compartment, baggage compartment, heater room and motorman's cab on the other side. With the center-entrance arrangement no passenger has any good reason for going into the baggage compartment, while ladies are never obliged to go through the smoking section. Furthermore, the conductor stands in the center of the car at all times in the best possible location to maintain supervision. Another advantage of the center entrance, which is of real importance at the short stops of "limiteds," is that the rate of passenger interchange is higher because people can go in and out at the same time. In accordance with State regulations, colored passengers are directed to take the seats at the rear.

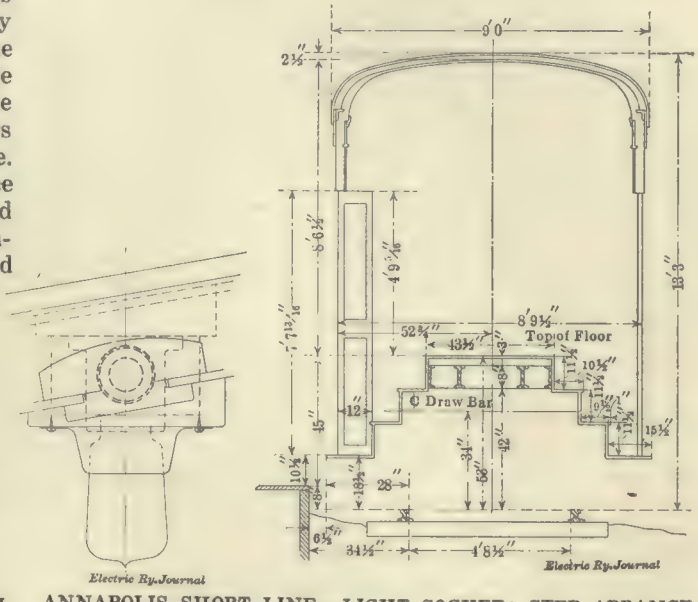
Since the car is operated double-ended it was desirable to know in advance whether a car of the width proposed would allow ample room for the conductor and passengers if stairways were provided on opposite sides of the center platform; also if the treads and risers would be comfortable for women and other passengers. Hence before deciding upon this feature a model platform was built and a number of people were invited to walk up and down the steps and to walk by each other in opposite directions on the platform. As shown in an accompanying drawing, these tests indicated that a platform 43½ in. wide with three risers of the uniform height of 11½ in. and treads of the widths marked on the drawing would give satisfactory passenger interchange conditions. The same plan was followed in connection with the motorman's cabs, a dummy with standard control apparatus therein being constructed to ascertain the most satisfactory minimum clearances. The results are indicated in the general plan, from which it will be seen that room was left for an observation window at the main compartment end, while the similar layout of sash at the baggage compartment end is especially welcome when this section is used as a post-office car.

The new Wason cars are 55 ft. long, 8 ft. 9 in. wide, 15 ft. 6 in. high to top of lowered pantograph, and weigh 80,300 lbs. They seat fifty-two passengers each. The trucks are Brill MCB-2X of 6-ft. 6-in. wheelbase with 36-in. rolled steel wheels. The underframe includes 10-in. 15-lb. channels for the side sills, four intermediate 8-in. 18-lb. I-beams and cross connections of 5 in., and 6-in. 8-lb. channels. At the center of the car all longitudinal members are interrupted except the center intermediate sills. To take care of this a plate 11 ft. 6 in. x 38 in. x ¼ in. thick is riveted to these center sills and also to the cross-members nearest the platform. Additional diagonal bracing is also provided. The important members of the framing are the T-posts for sides and roof and the side sheathing of No. 10 steel plate. The arch roof is of wood with twelve Automatic ventilators. The floors in the passenger and motorman's sections are also of wood covered with elastic tiling. The interior finish is mahogany with agasote ceilings, in the passenger sections.

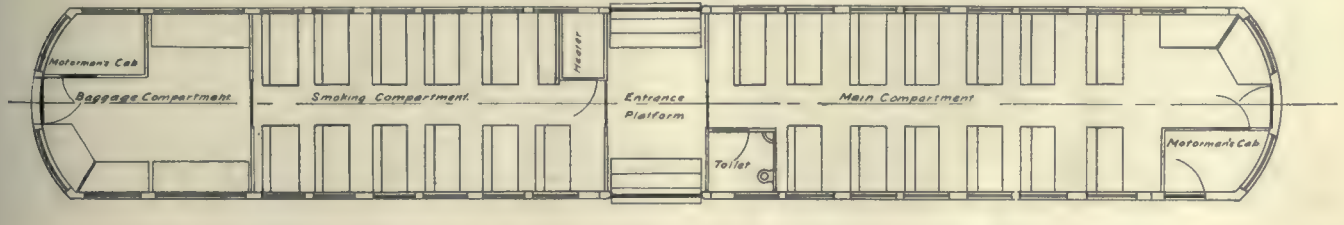
The cars are furnished with four 75-hp commutating pole motors Westinghouse 317-A-4 geared 20:69. They are wound for field control, the change from full field to short field being made by means of four switches



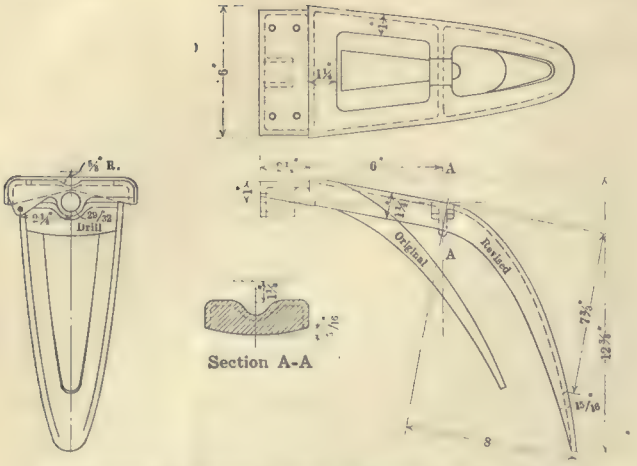
ANNAPOLIS SHORT LINE—DIAGRAM OF BUZZER SIGNAL CONNECTIONS, ETC.



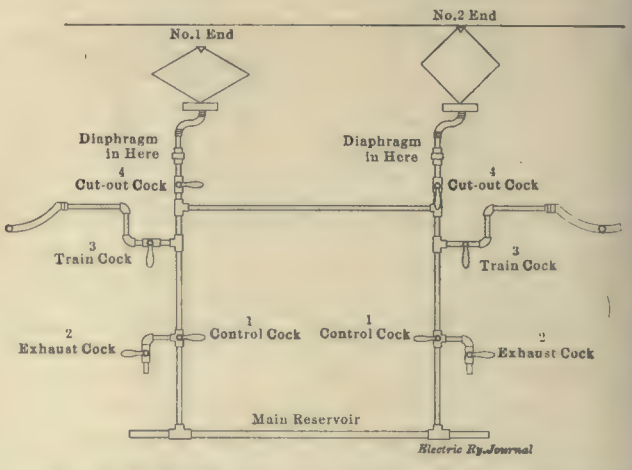
ANNAPOLIS SHORT LINE—LIGHT SOCKET; STEP ARRANGEMENT FOR CENTER-ENTRANCE CAR



ANNAPOLIS SHORT LINE—PLAN OF DOUBLE-END CENTER-ENTRANCE PASSENGER AND BAGGAGE CAR



ANNAPOLIS SHORT LINE—REVISED COLLECTOR



ANNAPOLIS SHORT LINE—PANTOGRAPH AIR CONTROL

in the unit switch group. The control is the motor builder's HLF design with resistance to cut down the line voltage to 210 for the switch group magnets. No dynamotor is used, the Westinghouse D2K compressor being operated directly on 1200 volts, while the lamps are wired ten in series at 120 volts each. These lamps are mounted in Mogul sockets with condulets. The arrangement illustrated on page 549 places the conduit as far back from the headlining as possible and secures a sightly appearance.

The signal system is of the buzzer type, which was adopted in preference to bell signals because it may be used for instantaneous signaling throughout any number of multiple-unit cars.

The Westinghouse AMM brake has the straight air feature for single-car operation and automatic for train service. It includes the Type J slack adjuster. The air sanders are Ohio Brass "Universal" design and the hand brakes are of Peacock type.

Instead of using the heavy M.C.B. coupler with accompanying draft rigging and anchorage casting the company adopted the Tomlinson radial coupler which saves 1400 lb. per unit. Hedley anti-climbers are used.

The cars carry two sliding pantographs. Only one pantograph is used at a time except when the other serves as a sleet cutter. These collectors are equipped with sheet steel shoes bearing against the wire with a pressure of 10 lb. to 15 lb. Experience indicates that grease grooves are unnecessary.

The shoe is built of 1/16-in. sheet steel 6 in. wide, 4 ft. long and flanged ¾ in. on each side. This, the only part which requires renewal, costs about 26 cents in labor and material for its average life of 1000 car-miles. Templets are used for the manufacture of shoes. As shown in an accompanying drawing, the aluminum pantograph horns have been altered in shape after they have been received from the maker to permit greater contact area for the shoe where oscillations are unusually heavy.

The pantographs are now arranged for straight air operation whereas they were formerly manipulated through combined air and magnet control. All locking devices have also been eliminated. Assuming that a man is to operate a car from the No. 1 end his first act would be to open the exhaust cock at that end and to close the exhaust cock at the No. 2 end. He could then close the train cocks at both ends of the car. Next he would open the cut-out at the No. 1 end and close the cut-out cock at the No. 2 end.

In every-day service the motorman does not have to go through this sequence of operations. But one pantograph is used each day, and all of the preparatory steps are cared for by the yard inspector. Hence, in regular service, the motorman has to change the exhaust cock only. He closes this cock in the cab from which he is not operating and opens it in the one from which he is going to operate. He is then ready to bring the pantograph into service by means of a three-way cock. Hose connections permit the operation of all active pantographs in a train from one cab.



ANNAPOLIS SHORT LINE—FORMING PANTOGRAPH SHOE



ANNAPOLIS SHORT LINE—PANTOGRAPH SHOE COMPLETED

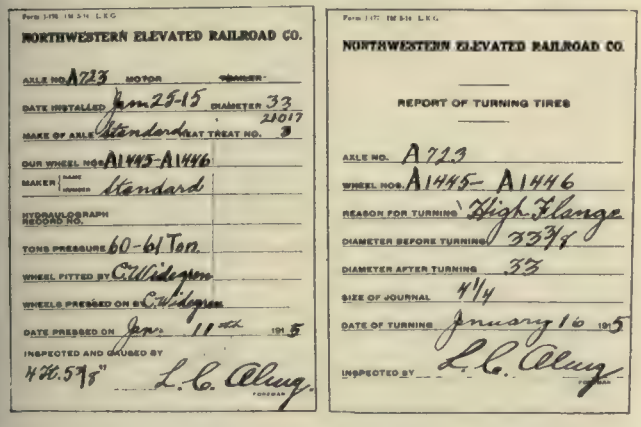
CHICAGO ELEVATED SHOP PRACTICE

Some of the Practices and Kinks Employed in Removing the Causes of Equipment Defects and Reducing Maintenance Costs

THE mechanical department of the Elevated Railroads of Chicago, in pursuance of a general policy of removing the cause of defects, in addition to devoting attention to the reduction of the cost of making repairs, has obtained most satisfactory and gratifying results with limited shop equipment.

WHEEL PRACTICE

In fixing a wear limit for steel wheels it was realized that, while there is a point at which flange wear may be limited to reduce to a minimum the amount of metal


NORTHWESTERN ELEVATED RAILROAD CO.

AXLE NO. A723 MOTOR TRAILER

DATE INSTALLED Jan 25-15 DIAMETER 33 21017

MAKE OF AXLE Standard HEAT TREAT NO. 3

OUR WHEEL NOS. A1445-A1446

MAKER Standard

HYDRAULOGRAPH RECORD NO.

TONS PRESSURE 60-61 Ton.

WHEEL FITTED BY C. Widegren

WHEELS PRESSED ON BY C. Widegren

DATE PRESSED ON Jan. 11 1915

INSPECTED AND CAUSED BY 4 7/16.5/5" L. C. Allen FOREMAN

NORTHWESTERN ELEVATED RAILROAD CO.

REPORT OF TURNING TIRES

AXLE NO. A723

WHEEL NOS. A1445- A1446

REASON FOR TURNING High Flange

DIAMETER BEFORE TURNING 33 3/4

DIAMETER AFTER TURNING 33

SIZE OF JOURNAL 4 1/4

DATE OF TURNING January 16 1915

INSPECTED BY L. C. Allen FOREMAN

CHICAGO ELEVATED—WHEEL AND AXLE RECORD; WHEEL TURNING RECORD

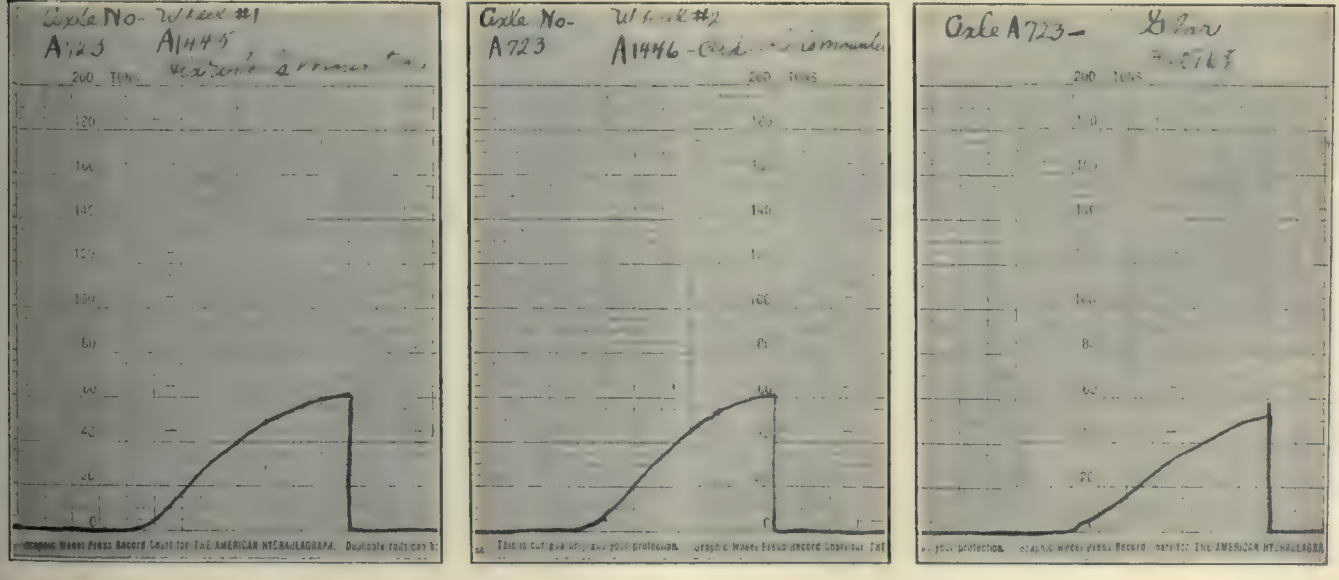
lost in turning, this consideration alone cannot determine the wear limits at which wheels should be removed from service. A practical wheel defect gage also must allow for reasonable wear on track special work. Following an investigation of many contours of worn wheels, and of the wear on rails, switches and frogs at a number of locations on the system and accurate measurement of wheels, switches and frogs at points where derailments occurred, the gage shown on page 553 of this issue was adopted. On this gage five limits are provided, namely, thin flange, low flange, high flange, pointed flange and straight flange. The dimensions of these limits are indicated, and the method of application of the different limiting points is shown in one of the illustrations.

In order to furnish some definite working standard, minimum and maximum pressures for pressing wheels on axles have also been adopted for the various sizes of axles. A hydraulagraph record is taken for each wheel at the time it is pressed on an axle, and this becomes a part of the permanent shop records. The maximum and minimum pressures adopted for the various axle diameters are as follows:

Diameter of Axle at Wheel Fit, in.	Minimum Pressures, Tons.	Maximum Pressures, Tons.
4	40	60
4 1/2	45	65
4 3/4	45	65
5	50	75
5 1/4	50	75
5 1/2	55	80
5 3/4	55	80
6	60	90
6 1/4	60	90
6 1/2	65	95
6 3/4	65	95
7	70	100

WHEEL AND AXLE RECORDS

Wheel and axle records are filed by axle number in an envelope which contains the records of all wheels and gears fitted to an axle during its life in service. Each envelope contains a hydraulagraph record of the wheel and gear fits, a turning record, a record of the position of the axle under the car from which it was removed and a record of the car number and the position of the axle when it is again restored to service. In addition to the axle number on the face of the record envelope, the size of the axle, the type (whether used on a motor or a trailer), the date on which it was put in service and the name of the manufacturer are shown. These axle and wheel records are then filed under the car numbers. To distinguish between axles in service and those in the shop, a separate file is kept for the latter. Records of the operations necessary to fit a new



CHICAGO ELEVATED—TYPICAL HYDRAULAGRAPH RECORDS OF WHEELS AND GEARS

axle or to renew wheels are prepared by the foreman in charge of boring mill, wheel lathe and wheel press.

EMERGENCY METHODS OF REMOVING WHEELS FROM AXLES

In the few cases where the pressure required to remove a wheel from an axle exceeds the capacity of the 200-ton wheel press, a gas heater is used to expand the wheel until the press will remove it. This heater consists of 1¼-in. pipe burner curved to fit the tire, several sizes being provided to fit different sizes of wheels.

Form J B.178 1M. 11-14.

AXLE NO. A723

NORTHWESTERN ELEVATED RAILROAD CO. CO.

WHEELS OUT AND IN

CAR 1043 DATE Jan. 25, 1915

	POSITION	OUR AXLE NUMBER	OUR WHEEL NUMBER	CONDITION	REMARKS
REMOVED					
APPLIED		A723	A1445 A1446	Good	New Axle

SIGNED. J. F. Riley.

CHICAGO ELEVATED—RECORD OF WHEEL APPLIED

Form J B.178 1M. 11-14.

AXLE NO. 676

NORTHWESTERN ELEVATED RAILROAD CO. CO.

WHEELS OUT AND IN

CAR 1043 DATE January 25

	POSITION	OUR AXLE NUMBER	OUR WHEEL NUMBER	CONDITION	REMARKS
REMOVED	1	723	A1446 A1446	Sharp Flange	Worn out Axle
APPLIED					

SIGNED. J. F. Riley.

CHICAGO ELEVATED—RECORD OF WHEEL REMOVED

Holes drilled on the inside of the burner rings permit the flame to play on the tire, and a smaller burner of the same size of pipe is used to heat the hub. These burners are connected into the shop gas and compressed air systems through a mixer located at the junction of the air and gas pipes and the burner ring. For the most obstinate cases approximately fifteen minutes are needed to heat the wheel to the required temperature.

WHEEL HOIST

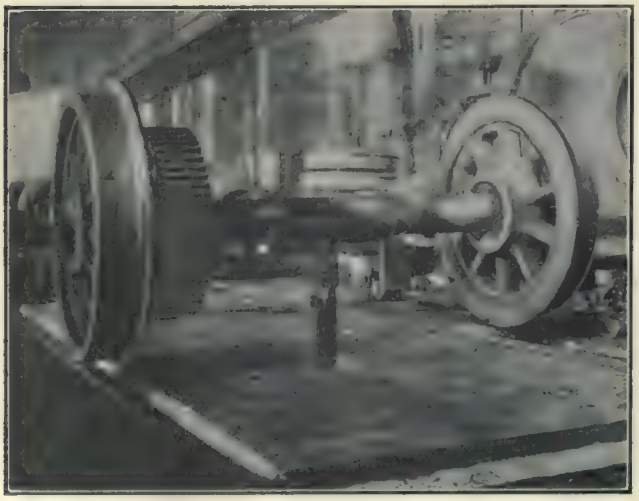
As the shop tracks parallel the axis of the wheel lathe, it is necessary to turn the wheels by hand or with the overhead bridge crane before they can be rolled between the lathe centers. To facilitate this operation, an old 10-in. x 12-in. brake cylinder was mounted in a pit beneath the shop floor and connected into the shop compressed-air system. A hollow piston was fitted to this brake cylinder so that the hoist saddle which received the axle could be inserted for turning a pair of wheels and then removed to keep the track and floor clear. The air control valve is operated by a key which is inserted in position only when the hoist is in use.

AXLE TESTING OUTFIT

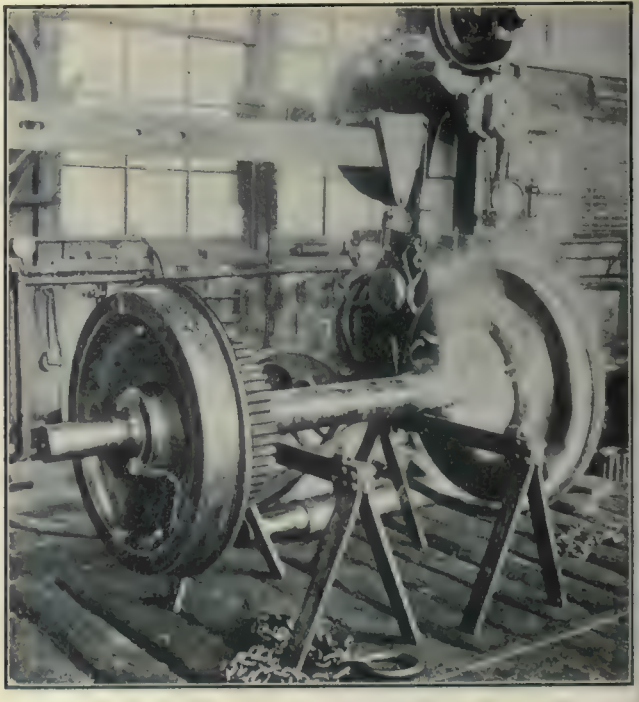
When cars are overhauled all axles are carefully examined and receive an impact test on both journals. The axle is set on two substantially-built horses placed just inside the wheel hubs, and, in this position is thoroughly cleaned and examined for flaws with a magnifying glass. If none is found, an axle-testing tool, consisting of a saddle striking block fitted with a babbitted bearing to prevent scarring, is set in position on the end of the journal. This striking block then receives four blows from a 12-lb. hammer, the axle being turned 90 deg. with each blow. If there is a flaw which is not evident under the magnifying glass, the sledge-hammer blows are quite certain to bring it out, its presence being indicated by thin film of oil which appears along the crack. This simple method of locating flaws in journals and axles has resulted in the removal of several defective axles from service.

METHOD OF MOUNTING PINIONS

The first operation in mounting a pinion is to prepare the key for a driving fit on the armature shaft.

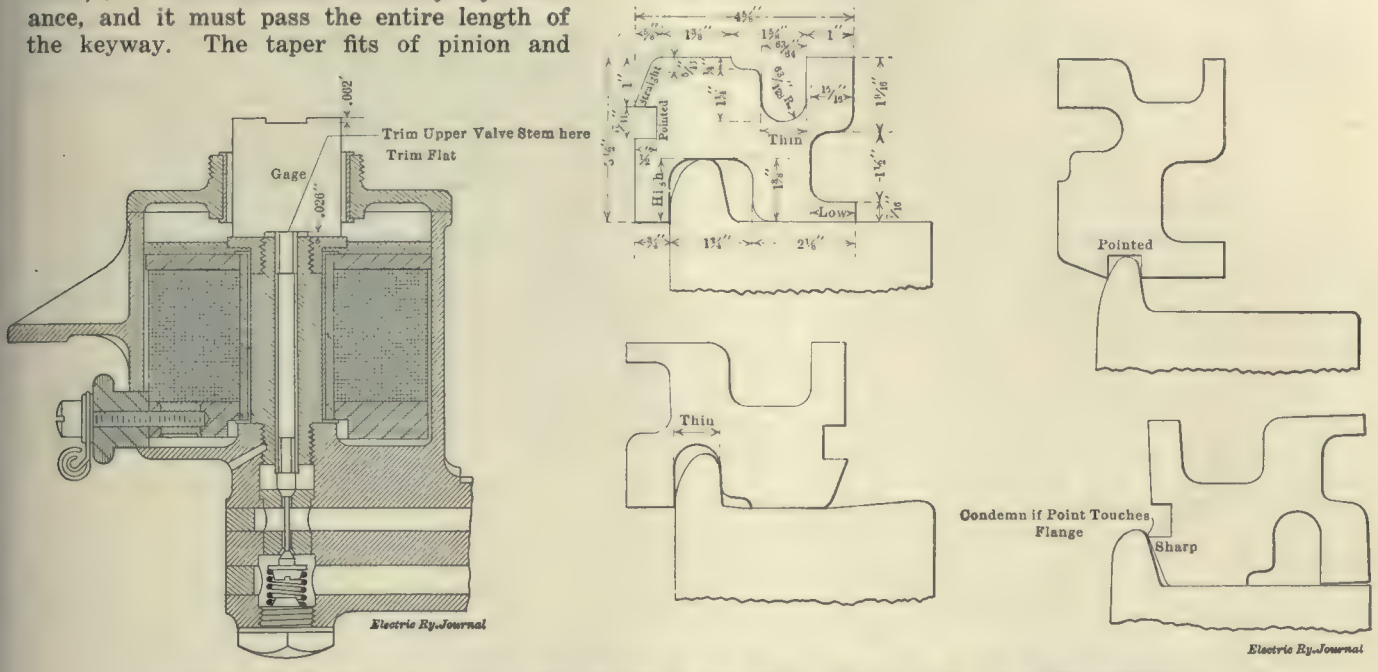


CHICAGO ELEVATED—WHEEL AND AXLE-TURNING HOIST



CHICAGO ELEVATED—VIEW OF WHEEL HEATING OUTFIT

Keys are required to fit snugly against the sides of the pinion keyways but not as tightly as on the shaft. After a key has been fitted, the pinion is slipped on the shaft to insure clearance between the key and the bottom of the pinion keyway. A "feeler" gage, 1/64 in. thick, is used to determine the keyway clearance, and it must pass the entire length of the keyway. The taper fits of pinion and shaft are compared by chalk-marking the shaft. A pinion may not be thrust against the collar at the back end of the shaft fit, since this introduces unusual stresses and may cause loosening.



CHICAGO ELEVATED—GAP GAGE FOR SHORT VALVE STEM; APPLICATION OF WHEEL-DEFECT GAGE

After a pinion has been fitted to the shaft, it is heated in boiling water for twenty minutes. After treatment by the boiling process, it is placed upon the shaft and tapped lightly into place, and the nut is applied to keep it from backing off. After the nut is in place the pinion is again tapped with a sledge hammer, and any movement is followed up with the nut. The pinion is not forced into place by hard blows as this introduces internal stresses when the metal cools, greatly decreasing its ability to resist service shocks.

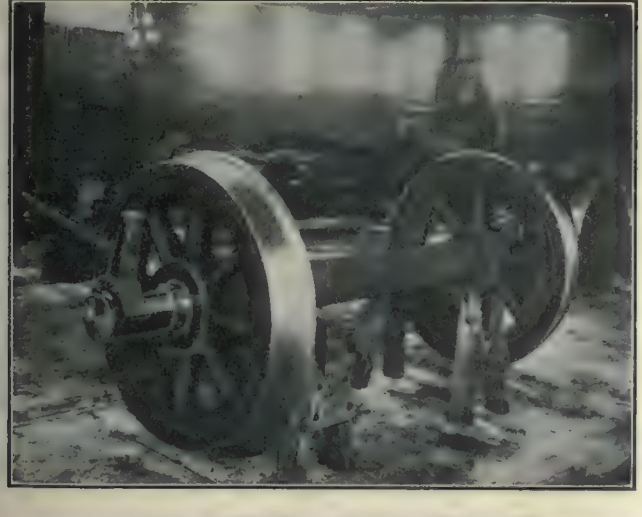
WATER-COOLED MANDREL BABBITTING MOLDS

The water-cooled babbitting molds used in this company's shops have greatly increased the output. A set of these is shown in an accompanying illustration. Running water is so connected to the molds that there is sufficient flow of cold water to cool the mandrels during molding operations. While the molds are out of service, they are coated with heavy petroleum grease to keep them in good condition.

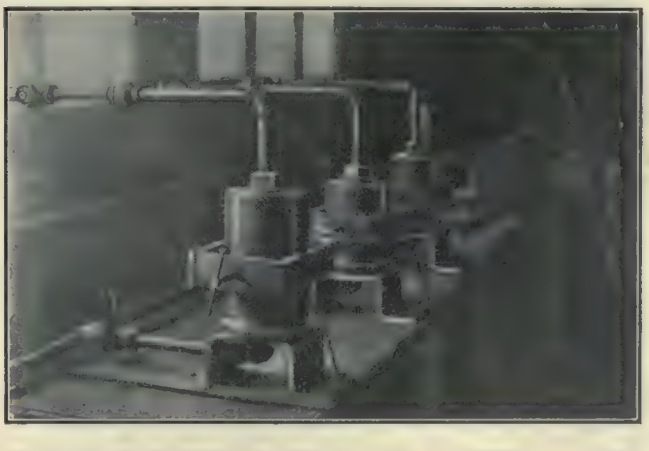
A strap-iron collar with two setscrews is fitted to each mandrel and serves to fasten the bearing shells in position while the babbitt is being poured. After the babbitt has been poured cold water is allowed to circulate through the mandrel to chill and harden the bearing surface. An excellent bearing surface is obtained without the blisters often produced by heated mandrels. The greatest advantage of the use of this method lies in the increased output, for, as compared with the use of a mandrel not water-cooled, the water-cooled mandrel has made it possible to increase the output of bearings eight to twelve times.

MOTOR TESTING

All motors are thoroughly tested after they have been completely assembled on the shop floor before being returned to service. This test, which is made primarily to determine the condition of the bearings, lasts for an hour, the motor being operated at the maximum speed attained in service. Inaccuracies in bearing sizes and fits, as well as damage to bearings or armature



CHICAGO ELEVATED—AXLE-TESTING SET



CHICAGO ELEVATED—WATER-COOLED BABBITTING MOLDS

shafts in assembling, are indicated thereby. Motors which do not develop hot bearings at speeds from 750 r.p.m. to 800 r.p.m. may run hot at 1400 r.p.m.

In this test the current is controlled by resistance between limits of 90 amp to 400 amp, which permits a 175-hp motor to be run as a shunt motor at its maximum service speed. The shunt connection allows full line voltage to be applied between brushes, and this serves as a final check on the condition of the armature. Finally, the motor receives a 1200-volt a.c. breakdown test, before going into service.

Air Compressor Test

After compressors are overhauled they are connected to the shop air supply system and are operated for at least twelve hours. While thus under test they are inspected and adjusted. As the compressors are controlled automatically during the test run, the operating conditions are analogous to a service test.

Multiple-Unit-Control Testing Outfit

Control equipment is usually tested only at line voltage, sight being lost of the fact that under normal operating conditions the voltage at the car sometimes drops to two-thirds or less of the substation voltage. For this reason the control repairmen of the Elevated Railroads are equipped with a voltage-control rheostat with resistance sufficient to reduce the line voltages to 300 or 350, for use between substations or at the end of a line where failures occur most frequently. By reproducing low-voltage conditions a repairman is able to determine whether the failure was due to this cause.

The rheostat is shown at the right in the cut in the next column. It is a perforated steel box with handles, in which a set of ordinary car heater coils is mounted. On a slate base fastened to the side of the box is a rheostat arm with contact points so tapped into the heater-coil circuits as to give a range of voltage from 250 to 450 in 25-volt steps. To conduct a test this outfit is arranged with one end of the heater circuit connected through a switch and fuse to the trolley, and the other end is grounded on the track rail. A third wire leading from the rheostat arm is then connected to the main switch in the car. All of the heaters and



CHICAGO ELEVATED—SPRING BALANCE IN CONTACTOR TEST

the compressor may not be in operation at the time the test is made, since the rheostat is of insufficient capacity to operate them. After the testing outfit has been connected in this manner, the circuit breaker is tripped and reset on low voltage, the reverses are thrown and the car control is run up on one-half line voltage.

If the control repairman is unable to locate defects by varying the voltage on the contactors, the pressure is reduced to 350 volts and the control is notched up to a position in which the maximum number of contactors is in service. An ordinary spring balance is employed to test the contactor pull if necessary. Very obstinate cases of trouble have been discovered in this way. In making the test the hook end of the spring balance



CHICAGO ELEVATED—CONTROL AND JUMPER TEST SETS

is fastened to the contactor switch mechanism. In this position the repairman reads the force required to pull out the contactor plunger. If the contactor coils are not short-circuited, a condition which the rheostat tests should show, the contactor, as a rule, will pull out at about 75 lb., providing the brass bushing and air-gap washer in the contactor are not unduly worn. This test indicates contactors which have worn air-gap washers or bushings. Contactors requiring a force of 100 lb. or more to pull them out are quite certain to cause trouble in service. Cases have been found where the air-gap washers were worn through and a 250-lb. force was required to move the contactor plunger.

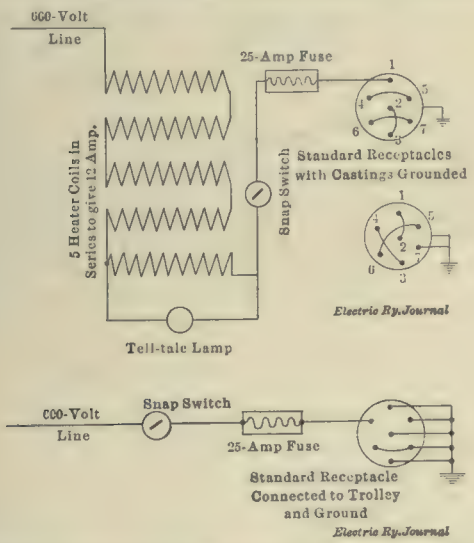
Pneumatic control is also tested with the voltage-varying rheostat. If any particular magnet fails to operate in this test, the inspector resorts to his valve gage as a means of checking or adjusting the air-gap. This gage is shown on page 553. In making this check adjustment, the magnet cap and armature are removed, and the gage is inserted with the 0.026-in. slot over the end of the upper valve stem. With the gage in this position and the switch closed the valve should be tight, showing that the final gap is more than 0.026 in., if the valve is in good condition. By inverting the valve gage so that the 0.062-in. slot may be pressed over the valve stem, the lower valve should not blow, a condition indicating that the final gap is not more than 0.062 in. If the gap is too long the upper valve stem is trimmed, and if too short the upper valve stem is stretched by peening, or a new valve stem is inserted.

Train Line and Jumper Test Set

A unique outfit for testing 600-volt control train line and jumpers, as used in Chicago, is shown at the left in the cut in this column. Essentially it consists of a transite-lined wooden resistance box with handles, containing two circuits, one for testing for open circuits and grounds, and the other for testing for short circuits. Circuit diagrams appear in the next column.

The method of inspection employed in these tests is this: After the ends of the jumper have been blown out they are connected to the two receptacles on the test set cabinet, shown diagrammatically. The current is turned on through a snap switch, and the jumper is twisted and shaken. If, during this operation, smoke or sparking is observed, or the pilot lamp on the top of the cabinet flickers, it is an indication that there is an open circuit or a ground to the plug casting.

In testing for short circuits, one end of the jumper is inserted in a third receptacle on the test cabinet, which is in the circuit shown in the lower diagram. The jumper is twisted and shaken in the short-circuit test, and short-circuited wires are indicated by smoke, sparking or the blowing of the fuse in the test circuit. One jumper circuit is tested at a time, the jumper plug being removed and rotated until each of the seven cir-



CHICAGO ELEVATED—DIAGRAMS OF TEST CABINET CIRCUITS

cuits has been connected to the live terminal. When jumpers are found to be in good condition, they are cleaned, the fiber ends are shellacked, and the cables and receptacles receive a coat of insulating paint. In a similar manner the train-line control cables for motor and trail cars are tested, two special jumper cables being provided for this purpose, one 8 ft. long and another 52 ft. long.

All jumpers and motor-control circuits are tested every month, and to designate the month, the receptacle lid and jumper head are painted a color corresponding to a month of the year. All jumpers are numbered, brass tags fastened to the cable showing the numbers. These are used in compiling records of tests.

As the life of a jumper cable is between two and one-half and three years, all are renewed after this period of service.

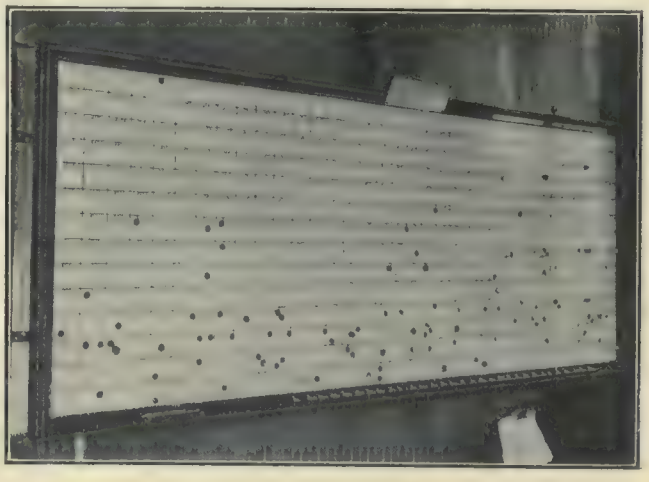
TROUBLE BOARD RECORD

The trouble board which is shown in one of the accompanying illustrations was devised to keep track of the work of six divisions involving repairs in any one of six shops. Its purpose primarily was to obtain a record of troubles at each division headquarters, so that incipient defects might be cared for and a special effort made to remedy the cause of defects which occur in the same equipment more than once. This board, in connection with the interchanging of reports of car repairs between division headquarters, makes possible a record of every case of trouble. Each terminal shop keeps a daily log-book of cars repaired. Copies of the records are exchanged among the divisions, a separate record being made for cars from each division. From these records, as well as from those returned by each division shop force, the trouble board is maintained. Each day the foreman's clerk records upon it the information contained on all repair reports for cars operating out of his division tags of different colors and dates.

The board contains a number of squares representing the different car numbers, and in each square are two, three or five hooks. Each hook is used for a certain class of trouble, and each record tag is dated the day the trouble was remedied. The squares containing two hooks are for trailers, one hook being for brake, and the other for bearing trouble. The squares containing three hooks are for trailers with control equipment, one hook being for brake, another for bearing, and a third for controller trouble. The squares containing five hooks are for motor cars, with one hook set aside for controller, another for motor, another for brake and compressor, and the fourth for bearing trouble. The center hook is for "no trouble found," or to indicate that the car has been overhauled.

Since each hook is used for a certain kind of trouble, the weaker parts of the equipment may be readily discerned, and if more than two tags representing one kind of trouble are mounted on the same hook of a particular car, it is inspected thoroughly to find a remedy. When a special effort has been made, a white tag is hung from this hook, the regular tag for the trouble record being red. If the same trouble is reported for the third time, the car is ordered out of service and to the main repair shops, where it is overhauled if necessary. When, as frequently occurs, trouble is repeated and no cause for it is found by the inspectors, a record is kept of it by a tag placed on the center hook of the particular car in question. When four tags representing "no trouble found" appear on the center hook, an expert is assigned to locate the defect.

This system enables the foreman to call the inspection-shop foreman's attention to the defect, and he in turn instructs the inspectors to give particular attention to the defect in question. In this manner inspectors are also educated up to the requirements of the service. Whenever a defect has occurred and two weeks have elapsed without its being repeated, the tags are removed from the board. A yellow tag, hung on the center hook, is used to indicate that a car has been overhauled. Like the other tags, this one bears the date on which the overhauling was completed.



CHICAGO ELEVATED—TROUBLE BOARD FOR 490 CARS

The trouble board also gives the division-shop foreman a comprehensive view of the condition of the equipment under his care, and automatically the defects which are repeated are indicated. The number of tags on a trouble board is an indication of the repair force efficiency, and at the same time the trouble-detecting ability of the various inspectors may be readily observed by the way in which they keep the board clear of tags. As shown in the accompanying illustration, a small shelf is provided along the base of the board, which is divided into thirty-one compartments, each containing tags of a particular number to indicate the day of the month.

SPRINGFIELD SHOPS AND CARHOUSE

Economical Use of Space and Provision for Convenient Handling of Cars Are Features of the New Plant of the Springfield, Ohio, Railway

EXTENSIVE improvements in the plant of the Springfield, Ohio, Railway Company, a subsidiary of the American Railways Company, are now nearing completion. These include new shops and carhouse which have been built on a site superior in every way to the site of the old ones, which were on low ground subject to flooding. While some of the maintenance work of the Springfield Railway is now done and will continue for the present to be done in the shops of the People's Railway Company at Dayton, about 25 miles away, the new shops have been constructed with a view to handling all of this work ultimately. For the present, one motor-driven 36-in. lathe, one motor-driven 24-in. shaper, one power hack saw, one wet grinder, one dry grinder, with a few small tools, work benches, etc., have been purchased. These, with the tools from the old shop, will be sufficient to care for ordinary up-keep.

There are at present 37¼ miles of single track in Springfield, and the rolling stock consists of sixty-nine cars of all classes. Ten new semi-steel cars of steel girder construction were delivered the first of the year, making twenty of this type now in service. The railway serves a territory with a population of slightly more than 50,000.

General Layout

The shops and carhouse occupy a lot 190 ft. in width and averaging more than 900 ft. in depth, the shops being at the back of the lot, while at the front a large space is left for future expansion of the carhouse. The general layout is shown in the accompanying block plan, which is designed to call attention to the following features: The carhouse containing ten tracks and separated into a six-track and a four-track section by means of a brick curtain wall; the shops and storeroom, forming three sides of a rectangle; the heating plant centrally located.

The track layout is designed to furnish storage space and reasonable facility for moving cars from this carhouse to the shop department. The shops are at the rear of the carhouse, and a track loop skirts the east, west and south property lines, passing around the building.

The Carhouse

The carhouse, 119 ft. x 234 ft. in size, has the following among other features of special interest:

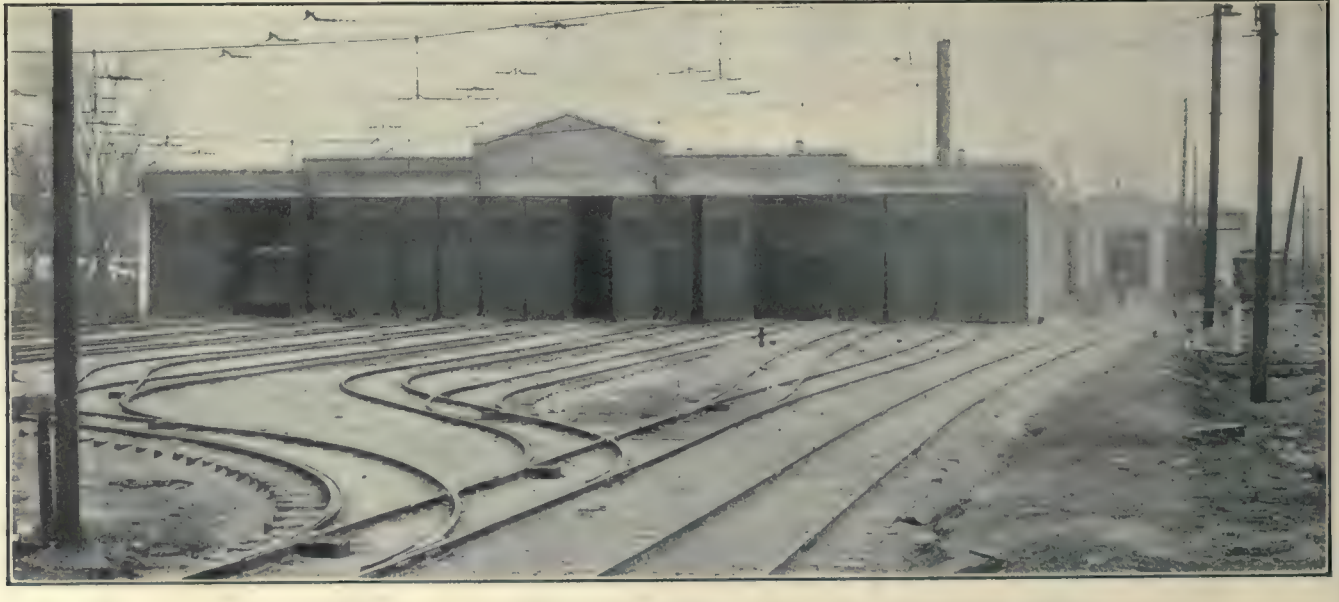
The building is divided into two-track bays by 2-in. curtain fire walls suspended between columns from the roof girders by steel straps. The wall comes down to within 8½ ft. of the floor. It is of concrete, plastered on both sides of a metal lath foundation, framed and supported as shown in detail in an accompanying illustration.

About two-thirds of the floor area is taken up with pits between which are reinforced concrete runways mounted on cross piers 12 in. thick spaced 12 ft. on centers. These piers also support the rails which form an integral part of the runway floor slabs. T-rails weighing 106 lb. per yard were used to furnish girder support for the cars between piers. The inner rails of parallel tracks are held to gage by tie rods on 4-ft. centers, and the floor slabs are molded down to their bases as shown in an illustration.

The floor slabs, which are well crowned, are 5 in. thick in the center. Concrete corbels cast solid with the floor slabs, engaging with the bearing projections on the piers, serve to keep the slabs in place. The concrete floor throughout the carhouse is surfaced with the Master Builders' hardener surface.

The roof of the carhouse is of 3-in. concrete slabs covered with a roofing cement known as Armorcote, applied directly to the concrete. This material has not been used on such large buildings before. It is a plastic, bituminous material. The frame of the building is of steel with 9-in. brick walls. Excepting in the outside walls, the steel work is exposed.

The north end of the carhouse is closed with wooden, swinging doors. While this plan appears somewhat re-



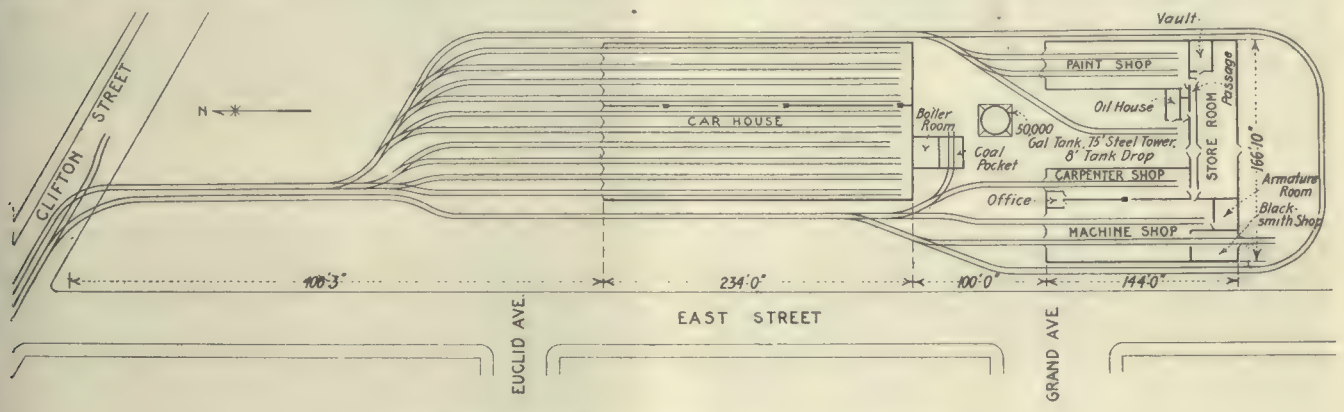
SPRINGFIELD SHOPS—VIEW OF CARHOUSE, WITH SHOPS IN BACKGROUND

actionary it has been used here because the construction, with exposed steel work, is not strictly fireproof and it was considered essential to have doors that could be broken out easily if necessary.

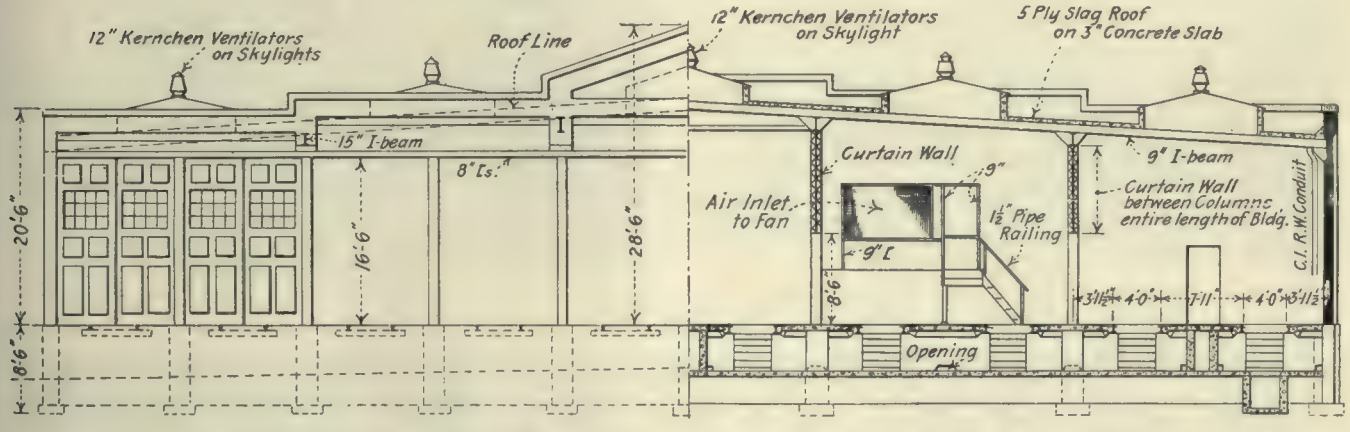
THE SHOPS

The shops are placed at the rear of the lot and are housed in a U-shaped building, of which the storeroom occupies the central portion, the paint shop one wing and the carpenter and repair shops the other. The storeroom is large enough to house supplies in sufficient quantities for the several departments of the company. A passageway along one side not only gives access to the storeroom but provides an inclosed passageway between the two wings of the shop building. By this arrangement the storeroom is readily accessible from all shops and at the same time is conveniently located for receipt and delivery of supplies to team trucks or supply cars. A platform for the latter purpose is placed on the south side.

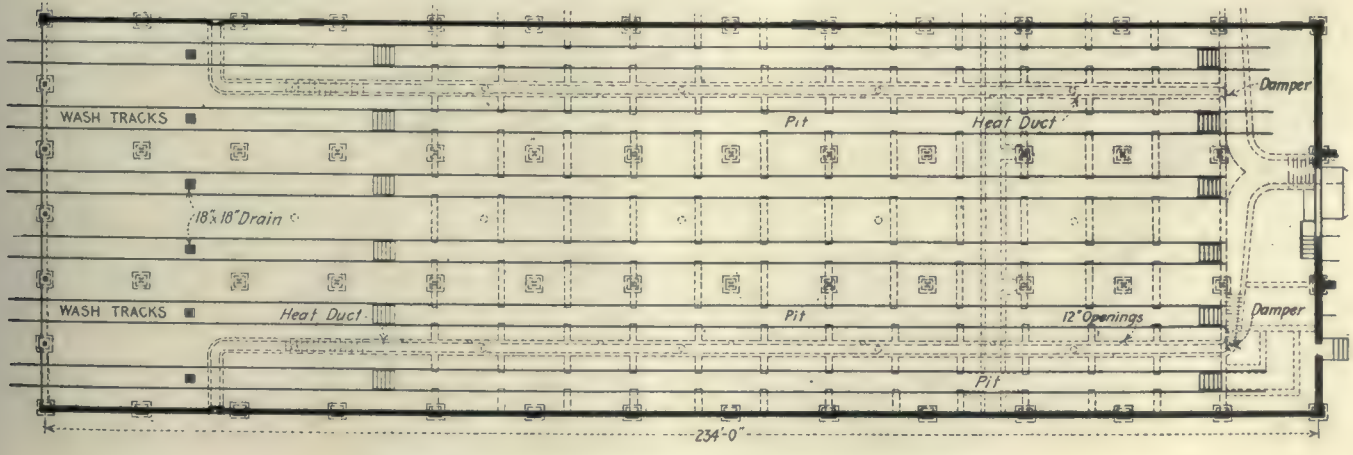
The storeroom is fitted with steel shelving, and at one end a fireproof vault for the storage of inflammable material, other than oil and paint, is provided. Oil and paint are stored in a separate room located in the angle formed by the paint shop and the storeroom. This paint and oilroom is inclosed with fireproof concrete walls and is located where it is reasonably well isolated for fire protection, but convenient for the handling of supplies, a track spur reaching the door. It is subdivided into a large oilroom, a paintroom and a closet opening into the paint shop for the storage of a day's supplies. The oilroom contains nine tanks, made by the American Oil Pump & Tank Company, with standard fittings and a convenient hoisting and track arrangement for rolling barrels over the tanks for filling purposes. The shelving in the paintroom is of steel check



SPRINGFIELD SHOPS—GENERAL PLAN OF PROPERTY



SPRINGFIELD SHOPS—HALF ELEVATION AND HALF VERTICAL SECTION OF CARHOUSE



SPRINGFIELD SHOPS—PLAN OF ONE BAY OF CARHOUSE

plates riveted to skeleton steel brackets supported from 2-in. x 2-in. x ¼-in. angle irons attached to the walls.

In the machine shop there are two tracks, one of which is served by a Columbia electric car hoist and a Columbia wheel drop. These types of hoist were described in the issue of the Electric Railway Journal for Sept. 19, 1914, page 535. The wheel drop in the Springfield shops is driven by means of a crank, spur gear and chain instead of the motor drive described in the above-mentioned article.

Each track is served by two light I-beam cranes equipped with two 4-ton chain hoists on each crane.



SPRINGFIELD SHOPS—VIEW IN CARHOUSE



SPRINGFIELD SHOPS—VIEW IN BLACKSMITH SHOP





SPRINGFIELD SHOPS—TWO VIEWS IN MACHINE SHOP



SPRINGFIELD SHOPS—VIEW IN WOOD SHOP

Practically all of the track in this shop and the adjacent wood shop is over pits. The machine, wood and paint shops and the storeroom are floored with hexagonal wood blocks. Special attention was directed by the designers to the location of shop toilet rooms, which are distributed so as to be accessible and to simplify the plumbing. The foreman's office, which is placed with its center line a continuation of the partition between machine and wood shops, is elevated and inclosed with glass, giving a direct outlook into both shops. The armature room is partitioned off from the rear of the machine shop, and over it is the drafting office.

All of the shop bays are brilliantly lighted through steel-framed windows, filling all of the span between columns. They are steam heated from the boiler plant described below.

TRACK AND OVERHEAD CONSTRUCTION IN YARD

The two tracks entering the property from Clifton Street fan out into twelve tracks in front of the carhouse. The special work here is somewhat similar to that employed by steam roads, being of the standard short manganese construction. The switches and frogs are of manganese centers with rolled rail bolted on arms, the centers being cast in the shortest possible lengths with wing extensions ground to fit the various sections of rail on one side with a standard angle bar on the other. This construction has been used by the American Railways for some years for certain locations, particularly around carhouses. It insures long wear life and, being of standard T-rail construction, is not extremely expensive. The special work was furnished by the Indianapolis Switch & Frog Company, Springfield, Ohio.

The trolley wire construction over this special work is supported from cross cables to provide a completely clear entrance way. These cables are carried on very heavy tubular steel poles and span the entire twelve tracks. The overhead construction is rendered adjustable by a liberal use of turnbuckles.

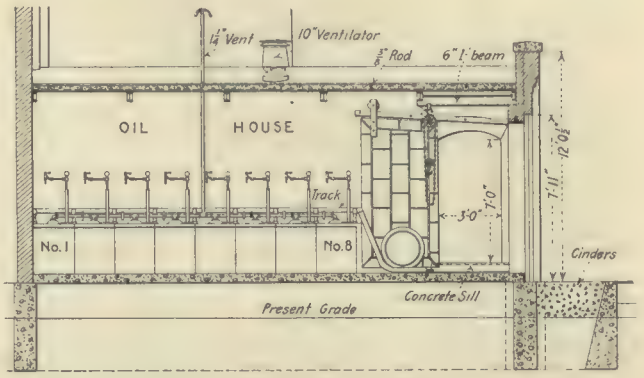
HEATING AND VENTILATING PLANT

The boiler plant has been designed with special reference to convenience in handling fuel and ashes. It is located in a 20-ft. x 23-ft. building and the boiler floor is 12 ft. below the carhouse floor level. Adjacent to it is a coal storage pocket with its top on ground level. A spur track leads directly over this pocket. Another rectangular well alongside the boiler room foundation walls houses an ash conveyor and a bucket elevator, which takes the ashes from a pit in one corner of the boiler room floor and discharges them into an elevated spout.

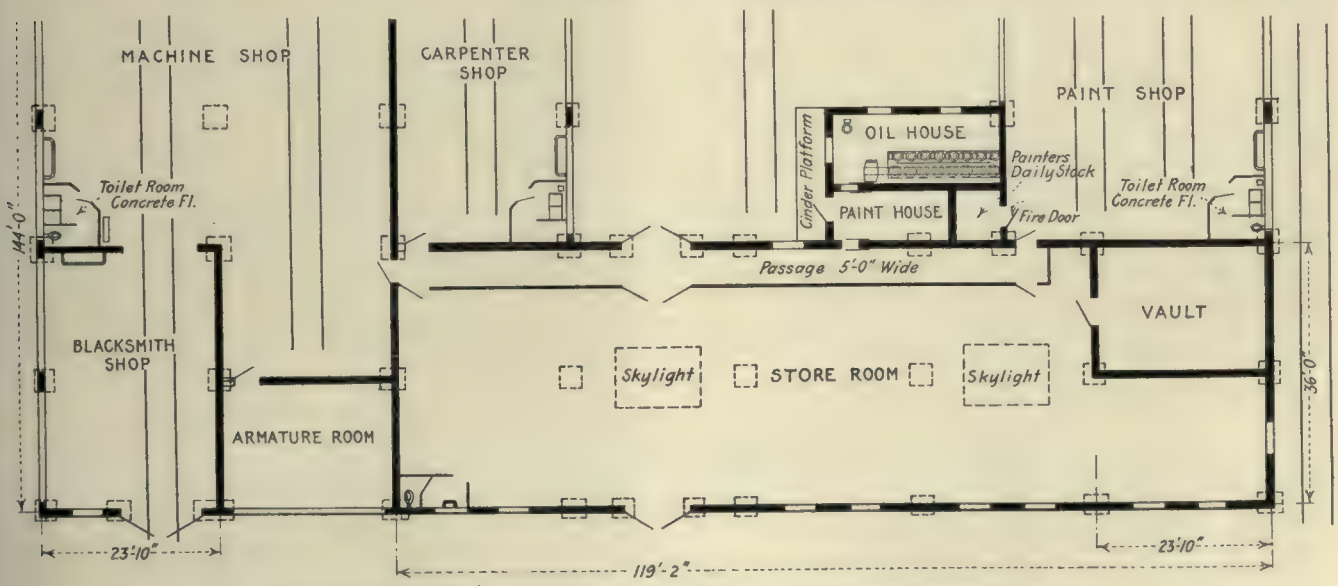
The heating equipment consists of two 100-hp "Economy" boilers, which supply low-pressure steam to the shop buildings for direct radiation and to the carhouse heater, which is for indirect heating.

An indirect radiation heating system supplies heat to the carhouse. The air is forced through concrete ducts located on the pit floor under the runways and provided with side openings at frequent intervals. The warm air is thus uniformly distributed over the pit floor, rising through the pit openings. Beyond the pit section the ducts terminate in large wall openings a short distance above the floor.

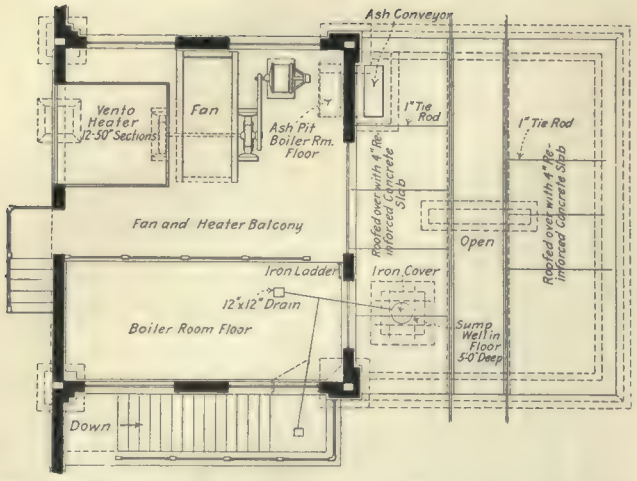
The fan, of the B. F. Sturtevant No. 12 multivane type, is located on a balcony in the boiler house which adjoins the carhouse on the south. It is driven by a 15-hp d.c. motor, is 58¼ in. x 30 13/16 in. in size and its speed is 168 r.p.m. These data indicate a delivery capacity of 32,000 cu. ft. per minute against a 1-in. head. Air is drawn from the carhouse through a 7-ft. x 9-ft. screened opening in the south wall and through a "Vento" heater containing 2430 sq. ft. of heating surface. The heater is supplied with low-pressure steam from the boilers. The fan discharges vertically downward into the main duct.



SPRINGFIELD SHOPS—VERTICAL SECTION OF OIL ROOM



SPRINGFIELD SHOPS—PLAN OF STOREROOM AND IMMEDIATE VICINITY



SPRINGFIELD SHOPS—PLAN OF BOILER ROOM AND COAL STORAGE

The heating system furnishes excellent ventilation, which is supplemented by means of 12-in. Kernchen ventilators mounted on the Anti-Pluvius skylights and placed 50 ft. apart.

CARHOUSE, SHOP AND YARD LIGHTING

There are no wall openings admitting light to the carhouse, but a good distribution of skylights provides ample natural illumination. These are arranged in five rows, one over each pair of tracks. The rows extend over the entire length of the pits and partly over the washing floor. The latter is also partly lighted from glazed panels in the north-end doors.

The artificial lighting of the carhouse, as well as the shops, is provided entirely by incandescent lamps operating in series groups of the 550-volt railway circuit. These groups contain either five or twenty lamps each. The general lighting of the buildings requires seven circuits of 80-watt, 28.6-volt Mazda lamps, twenty in series on each, with film cut-out sockets to cut out and short-circuit burnt-out lamps. These lamps are kept burning all night.

The auxiliary lighting, which includes pits, offices, toilet rooms, individual machines, etc., is from series circuits of five 40-watt Mazda lamps each. The pit lighting is arranged so that by using a three-point switch and a plug receptacle one lamp may be cut out and a lamp on an extension cord connected in its place for use in inspecting cars, trucks, motors, etc.

All circuits are controlled from a switchboard located in the foreman's office, which is separated from the shops by fire doors and has an outside exit. On this board are the usual circuit breakers, switches, meters, etc. All wiring is in conduit, and lamps are protected with guards.

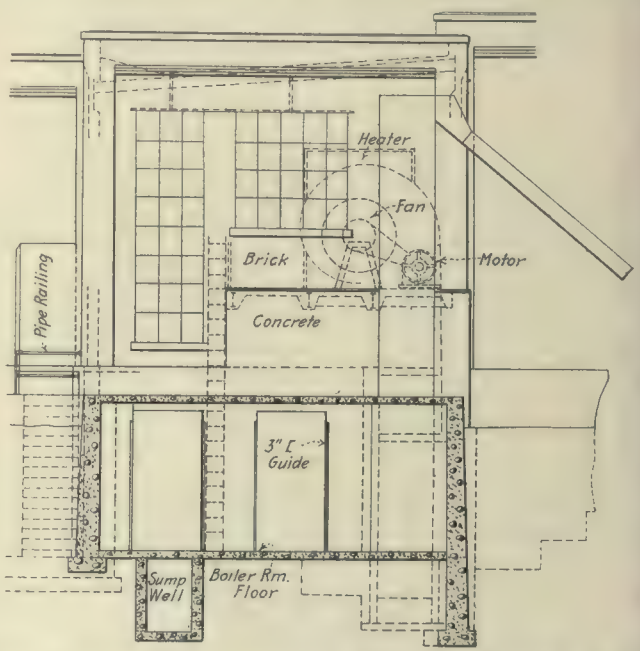
The lighting of the yards and around the buildings is included in the general scheme with twenty 80-watt lamps in series on each circuit. All fixtures are permanently fastened either to steel poles or to the buildings, out of reach of trolley poles.

FIRE PROTECTION

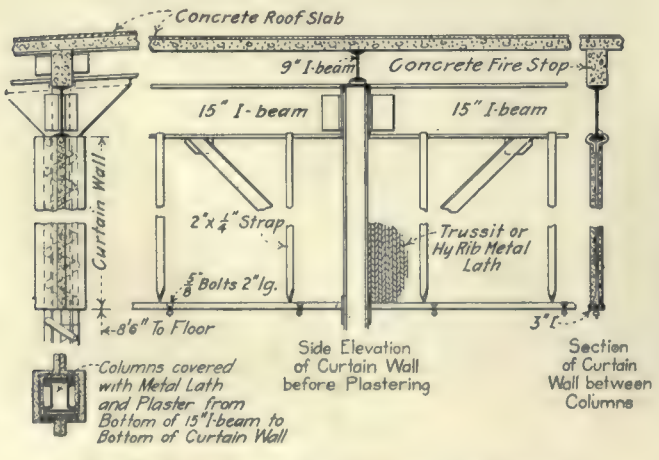
An 8-in. fire line connects with a 6-in. main on Clifton Street and runs nearly to the back of the lot, where a 50,000-gal. storage tank is located. From the main line 6-in. branches cover the property thoroughly, with outside hose houses and inside outlets.

In addition, the carhouse is provided for by means of a sprinkler system comprising rows of roof sprinklers over all tracks and a row under each curtain fire screen. A limited number of sprinklers are also distributed in the shops and storeroom.

As stated earlier, the Springfield Railway, of which George C. Towle is general manager, is a subsidiary of the American Railways. Mr. Towle is located at Dayton. The designs for the new plant were made in the offices of the latter company in Philadelphia, Pa., under the direction of C. G. Keen, engineer of maintenance of way. The superintendent of construction in charge of erection was Andrew Schmittauer.



SPRINGFIELD SHOPS—VERTICAL SECTION OF BOILER ROOM



SPRINGFIELD SHOPS—DETAILS OF CURTAIN WALL

Collect Fares on Former Free Service Line

After twenty-two years of free service, the Louisville (Ky.) Railway has begun to collect fares on what is known as its "Goss Avenue loop," which has been maintained as a feeder for the Shelby Street line. Four cars have been operated on it. Several reasons prompted the company to change the status of the loop line. Though service was free, the cars were used more or less as a convenience by the people of the section and in a number of cases those who suffered accidents brought suits for damages against the company. Lastly the "jitney" has been meeting the loop cars and getting many of the passengers they discharged at the end of the Shelby Street line. The "jitney" is not responsible for the change, but was one of the circumstances considered in making it.

SIGNAL MAINTENANCE METHODS

On the New York, Westchester & Boston Railway Ten Men Maintain Four Interlocking Plants and 110 Semaphore Signals at an Efficiency of 99.995 Per Cent

THE operating records of the signals of the New York, Westchester & Boston Railway show results that are typical for a high-speed suburban railway with moderately dense traffic. For the past year the record has been of the high order of 20,000 movements per failure. In the following paragraphs the maintenance methods are outlined, together with the scheme of organization, cost of maintenance and causes of signal failures.

The line, which has been described in previous issues of the ELECTRIC RAILWAY JOURNAL in considerable detail, has four tracks that extend between West Farms junction on the New York, New Haven & Hartford Railroad, to Columbus Avenue in Mount Vernon, a distance of about 7 miles. At Columbus Avenue a two-track line extends eastward to North Avenue in New Rochelle and another two-track line extends northward to White Plains, the two branches having respective lengths of approximately 2¼ miles and 9 miles. At 180th Street, about 1 mile north of West Farms, is a thirty-five-lever interlocking plant with twenty-one working levers, from which are operated double cross-overs that serve the main car storage yard and the repair shop. At Columbus Avenue there is a twenty-nine-lever interlocking plant with twenty-two working levers serving the two branches, and the end of each one of the branches is an interlocking plant to provide for switching movements of cars at the terminal. The plant at New Rochelle has a seventeen-lever machine with eleven working levers and that at White Plains has a twenty-nine-lever machine with twenty working levers. All interlocking plants are operated by power and have electrically-operated dwarf signals and semaphore signals. The latter are controlled by the track circuits in advance as well as by the interlocking levers, so that when the main-line switches are lined up the main-line signals within the limits of the interlocking operate semi-automatically, or, in other words, the signals are cleared by the lever and return to horizontal automatically after the train has passed.

The road is divided into blocks approximately 4000 ft. long, and practically every one of the signal mechanisms has two blades, one of which serves as the distant indication for the block in advance, and the other as the home indication. Sixty-cycle current is used owing to the fact that the propulsion current is of twenty-five-cycle frequency. The apparatus throughout is of the Union Switch & Signal Company's make. Two-position semaphores are used in all cases (except for four light signals in a short tunnel) and most of them are suspended from the catenary bridges. The semaphore arms are center-pivoted, and are counter-weighted to return by gravity to horizontal, each having a movement of 60 deg. from this position. The sempahore signal mechanisms are of the Union Switch & Signal Company's "Style B," the two arms on each mast being operated by the same motor and transformer that actuate two slot-arms, giving independent operation for each blade. The dwarf signals which govern slow-speed and reverse movements in the interlockings are of the simple solenoid type and require very little attention.

Power for operating the signals, switches and track circuits is obtained from the main feeders carrying 11,000-volt current. The signal current, which is delivered at 2200 volts, sixty cycles, single phase, has its change in frequency effected in a substation located at Columbus Avenue which contains two frequency chang-



WESTCHESTER SIGNALS—AUTOMATIC AND INTERLOCKED SIGNALS AT CROSS-OVER SOUTH OF 180TH STREET INTERLOCKING PLANT



WESTCHESTER SIGNALS—TYPICAL SEMAPHORE SIGNALS ON CATENARY BRIDGE FOR DOUBLE TRACK



WESTCHESTER SIGNALS—ELECTRIC INTERLOCKING MACHINE FOR SWITCHES AT COLUMBUS AVENUE JUNCTION

ers, each consisting of a 37-kw single-phase generator, mounted on the same shaft and driven by a three-phase induction motor.

Organization

Altogether there are 110 semaphore signals on the line and these, together with the four interlocking plants that are in continuous operation, are kept up by a force of ten maintainers. The signal organization is headed by F. Zogbaum, engineer of maintenance New York, Westchester & Boston Railway, who has general supervision of the track overhead lines, buildings and other permanent equipment of the company, and to him the general foreman of signals, C. E. Arnold, reports direct. Under the general foreman of signals are nine maintainers, one maintainer's helper, and one substation foreman. Of the maintainers, eight are assigned to definite sections of the road, while one is called a "relief man" who works at any point on the line where his services are required and who takes the place of any maintainer that is laying off. The helper works under the orders of the relief man.

Six of the signal maintainers work twelve-hour shifts, one day man and one night man being assigned to each of three sections into which the road is divided. One of these sections includes the interlocking at 180th Street station and all signal apparatus between 180th Street and the West Farms junction, giving a total of eighteen high signals and 0.80 mile of four-track route in addition to the interlocking plant and dwarf signals. The second section includes the North Avenue Tower in New Rochelle and all signal apparatus on the New Rochelle branch as well as the signal apparatus south of the Columbus Avenue interlocking plant as far as the territory covered by the previously described section. This gives forty-six high signals and 7.63 miles of route to be maintained in addition to the small interlocking plant at New Rochelle.

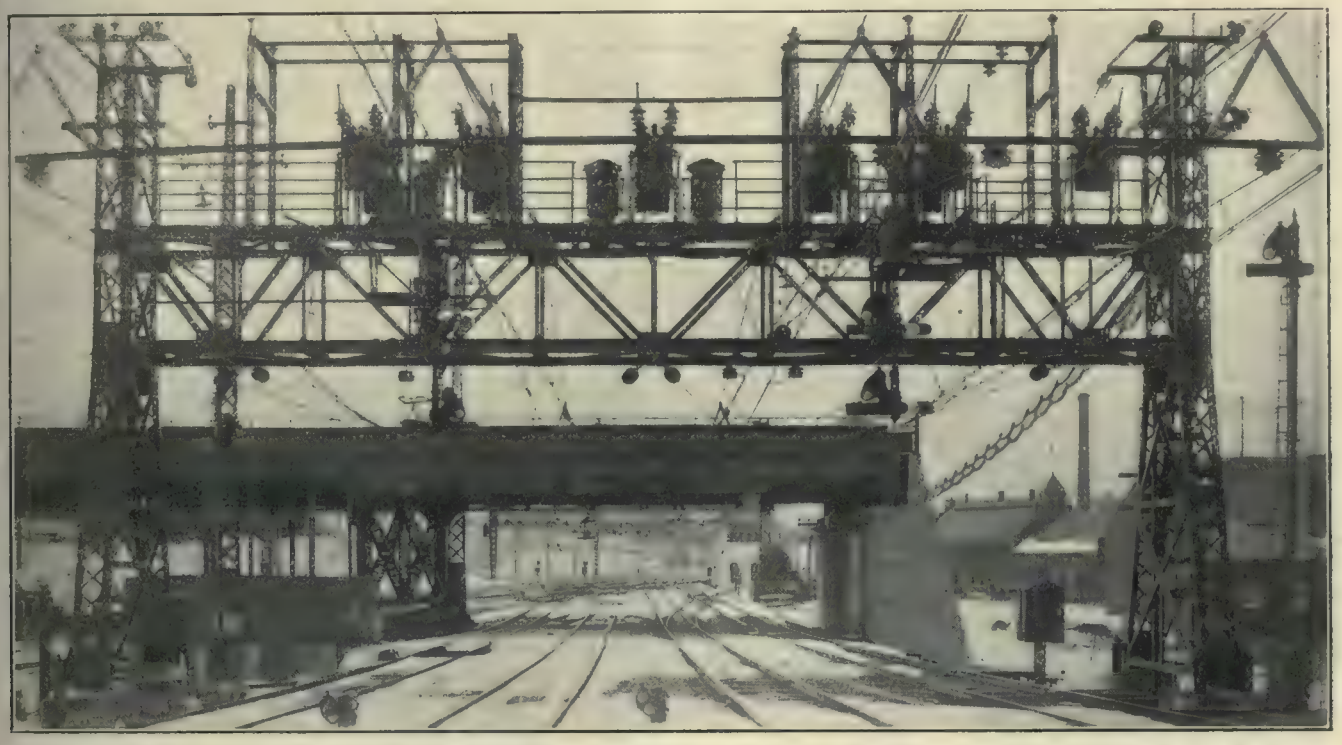
The third section includes the White Plains interlocking plant and the signal apparatus on the White Plains branch which is maintained as follows: The day maintainer covers from White Plains to a station 6.64 miles south and has twenty-six high signals to inspect. In addition to his regular work of inspection and repair,



WESTCHESTER SIGNALS—CROSS-OVERS AND STORAGE YARD SIDING NORTH OF 180TH STREET INTERLOCKING PLANT

this maintainer answers calls in case of trouble between the south end of this section and the limits of Columbus Avenue interlocking, 2.28 miles further south, including eight additional high signals. The night maintainer covers the entire section from White Plains to the limits of Columbus Avenue interlocking and thus is responsible for a route of 8.82 miles and thirty-four high signals. The above-mentioned section of 2.28 miles of route and eight high signals is normally maintained by the day maintainer at the Columbus Avenue interlocking plant.

These three sections include the entire road with the exception of the interlocking at Columbus Avenue, and this plant is maintained by three men who act also as substation operators, one of them being the previously-mentioned substation foreman. These men work ten-hour shifts, and there is an overlap of four hours between 1 p. m. and 5 p. m. when two men are on duty at this point. This overlap provides an opportunity for the maintainer to inspect and repair the automatic signals within the previously-mentioned section, 2.28 miles north. This man, however, is not subject to calls from this territory, as the emergencies are cared for by calls upon the maintainers at White Plains.



WESTCHESTER SIGNALS—VIEW OF JUNCTION WITH NEW HAVEN TRACKS SHOWING SIGNALS MOUNTED ON SECTIONALIZING BRIDGE AND ON INDEPENDENT MASTS

The work of the signal maintainers listed above is confined generally to inspection and the lightest kind of repairs. Heavy repairs are done in all cases by the relief man and his helper. The latter work includes all replacements and any work which requires the removal of apparatus to the maintainer's shop which is located at the 180th Street station.

A telephone system has been installed on the railway company's line in underground ducts, and the repairs on this are kept up by one man who is separate from the signal maintenance department and who reports direct to the engineer of maintenance. This telephone repairman does all the repairs to wiring and apparatus, very little material being sent to the manufacturer for overhauling. In case of heavy cable work, the repairman is assisted by electricians from the line department, as such work is only occasional in character.

This telephone system is used for train dispatching as well as intercommunication between stations. The train dispatcher's wire runs to each tower and, in addition, connects into outlying phones located at station platforms and on catenary bridges between stations where the distance warrants it. The telephone system is of the Western Electric inter-calling type and is arranged with a number of selector relays. Twelve per cent of the telephone line mileage consists of seven-pair, No. 19 gage cable; 33 per cent, fifteen-pair, No. 10 gage cable; 46 per cent, twelve-pair, No. 10 gage cable, and 9 per cent, ten-pair, No. 10 gage cable. There are twenty-five P. B. X. phones, seventy jack-box phones, which include stations, towers and outlying telephones, and twelve magneto phones, making a total of 107 phones of all types. The power used for the telephone system is obtained from a central storage battery which is charged by the same motor generator that is used for charging the signal batteries, the motor generator receiving power from the signal mains.

INSPECTION METHODS

As mentioned above, the work of the maintainers who are assigned to certain districts is confined to inspection, and it is the rule of the road to examine everything once each month, although the electric locks on the interlocking machines are tested once each week. In making inspections the maintainers travel over their district on the regular trains, which are operated on a very short headway. No gasoline speeders are used because of the short distances to be covered. The night men who work between the hours of 1 a. m. and 5 a. m., when no trains are run, are assigned each day to work that will keep them in one locality, so that there is no necessity for their moving about when the trains are not running.

Whenever failures occur they are reported at the end of the run by the motorman to the dispatcher, who communicates with the proper maintainer and has the signal repaired at once. It is the endeavor, however, to make the inspection sufficiently thorough so that failures may be anticipated, and in the regular routine the relays are tested by tilting them over to see if they move freely, the impedance bonds are examined for heat-

ing and the transformers are opened to see how much oil they hold and whether taps are in good condition.

As an aid to the maintainers the maintenance department has recently published a book of permanent instructions for the proper maintenance of switch and signal apparatus. This book contains such items as the following: "The signal apparatus should be carefully inspected and cleaned, especially movable parts of the mechanism, care being taken to see that these do not get tight from lack of lubrication or gummed from the use of too much oil. The bearings should be oiled at least once a month, the oil should not be applied too lavishly and any surplus must be wiped off. Wire connections on binding posts should be examined to insure that the wires are not ruptured, and it should be observed that all connections to moving parts have proper freedom and do not have sharp ends that are likely to catch in other parts of the mechanism. Slot contacts and the roller should be wiped once a month with a piece of cloth or chamois skin. Relays that are found to be working improperly should be removed for test and inspection. When a relay is turned partly over all the contacts should make simultaneously and when energized with the normal operating current, as shown on the label, there should be about 1/32-in. slide in the contact points. The springs of the contact fingers may lose tension and cause the contact to get out of alignment. The armature should have about 1/64-in. end-play on the trunnions. Efforts to adjust a relay should not be made under any circumstances."

Unbalancing is treated as follows: "With a.c. track relays unbalancing of the track circuit above a certain amount is liable to cause the relay to open or to prevent it from making up. This may be caused by a defective power return, such as defective bond or broken rail. It will generally be manifested by excessive heating of the relay and track transformer. Unbalancing is liable to cause warping of the relay frame, owing to the excessive heat of long duration. The power return should be looked after where there is any indication of unbalancing."

A general rule book of the maintenance department is also published. This includes rules for the guidance of the signal foreman and for the signal maintainers with regard to traffic, such as that signals must be kept in a horizontal position while repairs are being made; that during severe storms of sleet or snow signal maintainers are required to assist in keeping switches, signals and interlockings in proper working order; that when trackmen are laying new rail or making changes in the track that affects track-circuit or interlocking connections the maintainer must be present to see that the rails are properly bonded and that the interlocking connections are restored; and the like.

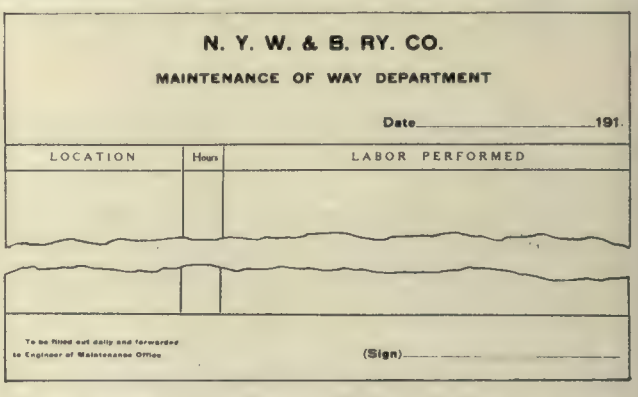
REPAIR METHODS

As mentioned before all repairs aside from inspection and such work as making wiring connections, cleaning and oiling apparatus and similar operations are done by one maintainer, called the relief man, and one helper. The relief man is located in a small shop at the 180th Street station, where the more delicate pieces of signal apparatus are repaired. The heavier parts of the mechanism which involve machine or blacksmith's work are repaired in the near-by car-repair shop.

All of this repair work is done by the railroad company's forces and none is sent out to the manufacturer with the exception of the manufacture of such small special parts as detector locks for the interlocking, slot-arm latches, etc., whenever these are needed for replacement. In general, all repairs are effected by replacing the defective parts with others in good condition, the piece requiring repairs being removed and brought to the shops. In this connection it is interesting to note that the installation is of such high grade and the maintenance methods so thorough that no apparatus has been in need of anything more than really minor repairs during the three years that it has been in operation. No relays have required complete rewinding, nor have there been any serious failures resulting in extended damage to signal mechanisms, motors or transformers. Even the blades for the semaphore arms, which are made of wood and covered with enamel paint, have not yet required repainting.

The relief man and his helper, in addition to making repairs and relieving maintainers who may be off duty, are assigned to all construction work that is done on the line. Since the road was constructed two spur sidings have been installed and equipped with switch indicators. These switch indicators, together with the electric locks and other accessories, were supplied by the Union Switch & Signal Company, but the scheme was laid out by the railway company, and since the installation of this system for outlying switches the operation has given satisfaction in every respect.

Repair material is kept in the general storehouse of the railway company at 180th Street, rather than in the signal maintainer's repair shop. The material on hand


N. Y. W. & B. RY. CO.

MAINTENANCE OF WAY DEPARTMENT

Date_____191.

LOCATION	Hours	LABOR PERFORMED

To be filled out daily and forwarded to Engineer of Maintenance Office

(Sign)_____

WESTCHESTER SIGNALS—DAILY WORK REPORT MADE BY MAINTAINERS

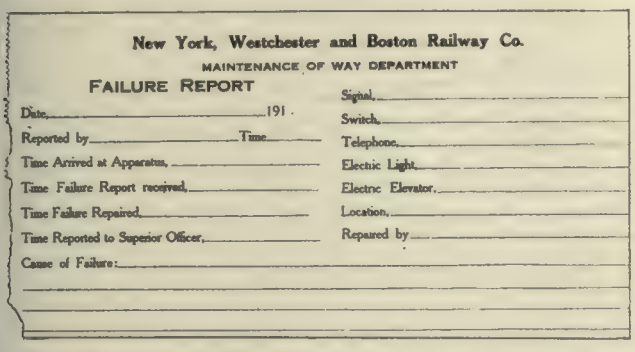
consists of one complete signal mechanism for a two-blade signal and one for a single-blade signal. There is also one of each of the two styles of switch movement that are installed in the interlockings. For the automatic signal equipment there are four double-rail transformers, one single-rail transformer, two line transformers and two track circuit transformers. There are six line relays, ten track relays, and eight d.c. relays for the interlocking plants, together with four impedance bonds. This equipment has been found to be more than necessary for making prompt repairs, although there are 483 relays in operation on the line.

The signal maintainers are required to make out daily and forward to the engineer of maintenance statements of the work that they have done during the day. These statements are made out on the form reproduced in the accompanying illustration. In addition each signal maintainer turns in a report of the regular monthly inspection which he is required to make. This is also shown in one of the accompanying cuts. The general signal foreman is required to make a thorough inspection of the line in general every two months. This report provides for a division of the 18 miles of line into six sections, and for each section the following items are covered: Signal ladders, signal platforms, signal-platform trap doors, sectionalizing boxes for interlockings, locks on transformer housing, feeder protection screens, danger signs at substations and danger signs at tower transformer locations. As shown by the list of items, this report is largely for the purpose of

safety to the employees and to the public. The results of the weekly inspection of the interlockings by the maintainers are shown on cards which are turned into the office of the engineer of maintenance and filed in a card index.

MAINTENANCE RECORDS AND COSTS

As before mentioned, when failures occur they are, as a rule, first discovered by the motormen, who report



New York, Westchester and Boston Railway Co.

MAINTENANCE OF WAY DEPARTMENT

FAILURE REPORT

Date 191 .
Reported by Time
Time Arrived at Apparatus
Time Failure Report received
Time Failure Repaired
Time Reported to Superior Officer
Cause of Failure:

Signal
Switch
Telephone
Electric Light
Electric Elevator
Location
Repaired by

WESTCHESTER SIGNALS—FAILURE REPORT FORM MADE OUT BY SIGNAL MAINTAINERS

them to the dispatcher at the end of the trip. The dispatcher communicates with the proper maintainer, who proceeds at once to the defective signal and remedies the difficulty. As soon as the failure is overcome the maintainer fills out a form in duplicate, as shown in the accompanying illustration, the original being sent to the office of the engineer of maintenance. The carbon is sent to the general foreman of signals, who makes a further investigation in case this appears to be necessary. These failure reports are checked against the train detention reports which are made up by the transportation department and they serve as a basis for the daily report which is made by the engineer of maintenance to the president of the road with regard to the operation of all of the apparatus covered by his several departments.

Table I shows the causes of signal failures occurring during the last three months on record. In this a failure is considered to be any improper operation of a signal, but is considered independently of the number of trains that are stopped by the defective signals.

TABLE I—CLASSIFIED SIGNAL FAILURES ON NEW YORK, WESTCHESTER & BOSTON RAILWAY

	Nov.	Dec.	Jan.
Fuses blown	..	..	1
Power off and low voltage	4	1	1
Relay contact not making	..	2	1
Friction clutches on switches	..	1	..
Broken wires	2	..	1
Creeping switch points	..	..	..
Brakes on signal motors	..	1	1
Slot armatures	6	1	..
Lights burned out	1	..	2
Resistance coils burned out	..	..	..
Unknown and other causes	8	5	5
Motor contacts	..	..	1
Grounded wires	1	3	2
Car derailments	1	..	..
Snow	..	..	1
High-tension fuses	..	1	..
Resistance tube in track circuit	..	1	..
Totals	26	15	16

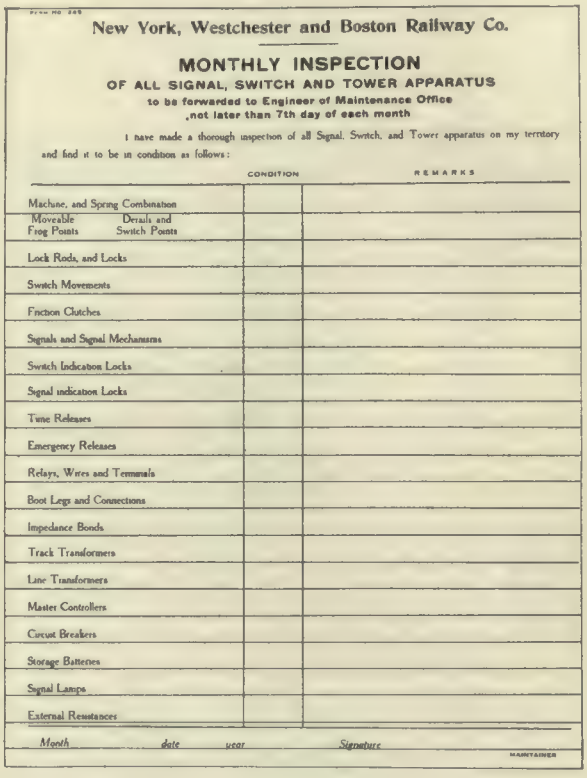
TABLE II.—TRAIN DELAYS CAUSED BY SIGNALS, NEW YORK, WESTCHESTER & BOSTON RAILWAY

	Failures	Delays	Minutes
March, 1914	15	0	0
April, 1914	20	20	89
May, 1914	19	27	125
June, 1914	10	1	8
July, 1914	11	34	114
August, 1914	27	102	309
September, 1914	21	23	48
October, 1914	10	1	3
November, 1914	26	2	8
December, 1914	15	10	71
January, 1915	16	1	5
February, 1915	14	1	2
Total for year	204	222	780

The record of trains stopped appears in the detention report of the transportation department, the signal department being concerned only with the operation of the signal as a piece of mechanism. No false-clear condition has occurred on the road since it began operation three years ago.

Table II shows the number of signal failures by months occurring during the current year, as well as the train delays that were caused by the signals. In this table the large number of delays that appear in May were due to grounded signal feeders and therefore were not all directly chargeable to signal mechanism. The large number of delays appearing in August were also due to grounded signal feeders as well as to high-tension fuse boxes and therefore were not chargeable to signal mechanism, although technically they had to be so charged.

All told, during the year 1914 there were 204 failures and 4,200,000 signal movements, corresponding to a



New York, Westchester and Boston Railway Co.

MONTHLY INSPECTION

OF ALL SIGNAL, SWITCH AND TOWER APPARATUS

to be forwarded to Engineer of Maintenance Office not later than 7th day of each month

I have made a thorough inspection of all Signal, Switch, and Tower apparatus on my territory and find it to be in condition as follows:

	CONDITION	REMARKS
Machine, and Spring Combination		
Moveable Frog Points / Derails and Switch Points		
Lock Rods, and Locks		
Switch Movements		
Friction Clutches		
Signals and Signal Mechanisms		
Switch Indication Locks		
Signal Indication Locks		
Time Releases		
Emergency Releases		
Relays, Wires and Terminals		
Boot Legs and Connections		
Impedance Bonds		
Track Transformers		
Line Transformers		
Master Controllers		
Circuit Breakers		
Storage Batteries		
Signal Lamps		
External Resistances		

Month date year Signature

MAINTAINER

WESTCHESTER SIGNALS—MAINTAINERS' MONTHLY INSPECTION REPORT

figure of one failure to 20,700 movements, or an efficiency of 99.995 per cent. This applies to all semaphore signals whether within limits of interlockings or otherwise but does not consider dwarf signals. The number of signal movements as stated for one year's operation includes the number of complete operations of each of the blades of each two-blade signal. The costs of maintenance for the signal department are subdivided between interlocking plants and two-blade automatic signals that are outside of the limits of interlockings, these being $1.95 per two-blade automatic signal per month, and $5.01 per interlocking function per month. The latter figure covers the whole function, consisting of the lever, the interlocking, the switch, the switch operating mechanism and the governing signal complete. The costs of supervision as well as labor and material are included in both figures. The total cost of maintenance per track mile is $23.67 per month, and the cost per function (either automatic signal or interlocking) is $3.32 per month, including all functions of the signal substation.

STEEL CARS ON THE LONG ISLAND

Ten Years' Experience with All-Steel Construction Has Shown That Deterioration Is Practically Negligible and That Routine Repairs Are Minor in Character

STEEL cars have been in service on the Long Island Railroad since operation of the electric zone began on July 26, 1905, and, owing to the ten years of service that the original cars have undergone, they afford an excellent example of the lasting qualities of steel construction. In so far as the framework of the car bodies is concerned, the steel cars generally have required less repair work than the wooden cars on the same line. All of the cars are in first-class condition, and it is the expectation of the management that they will last much longer than wooden ones, although the life of a wooden passenger car on the same road is between twenty and thirty years. Summed up, the experience of the Long Island Railroad in maintaining steel cars has been very satisfactory, and an account of the nature of the repair work that has been found to be necessary and of the methods followed for its accomplishment should be of interest to those considering the purchase of steel cars for heavy interurban service.



LONG ISLAND STEEL CARS—VIEW IN SHEET-IRON SHOP SHOWING POWER-DRIVEN MACHINE TOOLS

Character of the Steel Equipment

The 134 cars that were originally placed in service on the Long Island Railroad's electric zone were described in the Electric Railway Journal for Aug. 11, 1906. They were of the side-girder type of construction with composition floors and roofs, having a length of 41 ft. over corner posts, a total weight of 82,000 lb. and a seating capacity of fifty-two. These cars were operated in trains with wooden trailers.

In 1909 a new type of steel motor car was introduced, this being 54 ft. 6 in. over corner posts and having 5-ft. vestibules, measured over the couplers, the doors being 3 ft. wide. These cars weighed 107,000 lb. each, seating seventy-two passengers. Two hundred of them were purchased during 1909 and 1910, together with some baggage cars, but because of differences in coupler and platform heights they could not be operated in trains with the original 41-ft. cars, nor with the wooden trailers, and they have been used separately in all-motor-car trains.

The later type of car is equipped with two 225-hp motors mounted on one truck, and these give an acceleration of 1 m.p.h.p.s. with a maximum speed of approximately 54.5 m.p.h., the gear ratio being 25:48. The motors of the original cars are of 200 hp. with a gear ratio of 25:58, as the cars are designed to haul trailers. These motors give the same acceleration as in the case of the larger cars but the maximum speed is approximately 47.5 m.p.h.

The electric zone on the Long Island Railroad constitutes but a part of the total mileage, although the maintenance of all of the equipment of steam locomotives, coaches, rapid transit cars and trolley cars comes under a single department that is headed by G. C. Bishop, superintendent of motive power. On the lines at the east end of Long Island, which are operated altogether by steam, the passenger-coach equipment was originally of wood, although steel construction is displacing this rapidly at the present time. Both the steel and the wooden cars are repaired in the same shop, and this affords an excellent opportunity for comparing the work required for the different types.

Organization and Equipment for Steel Car Repairs

When the electric zone began operations in 1905 the car repair shop had been in operation for some time. The road, therefore, was prepared to handle wooden car equipment, and the organization for this purpose was

complete. But with the introduction of the large number of steel cars required for the electric zone it became necessary to provide a new class of workmen to make repairs that were peculiar to steel construction.

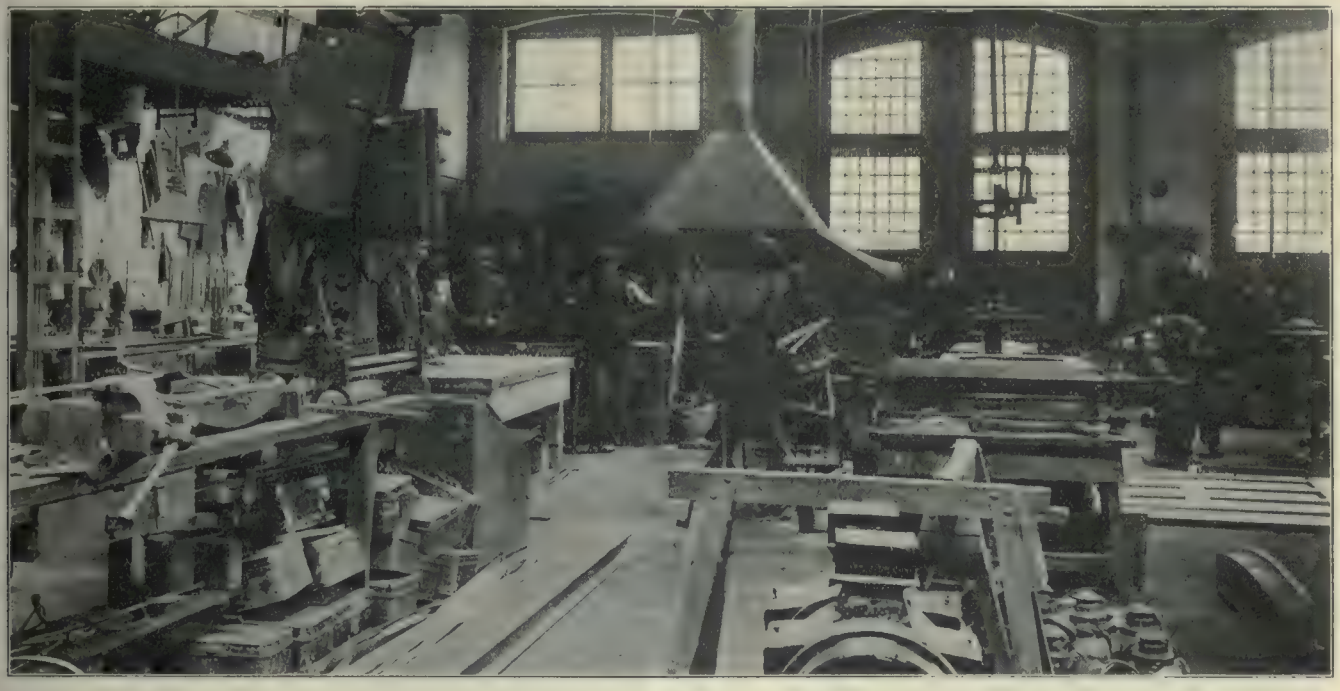
These steel-car repairers were put on about one year after the receipt of the steel cars. The original gang consisted of two structural iron workers and their helpers, experienced men being employed because they were familiar with the ordinary operations involved in riveting and in working structural shapes and plates. The helpers, however, were recruited from the existing shop force, and it was found that after these men had worked under the direction of the experienced gang leaders for a comparatively short time they acquired a considerable degree of proficiency in the use of the steel-worker's tools. Later on, as the original leaders drifted away, they were replaced by car repairers who had become experienced in handling steel. At the present time the force is composed of three workmen and their helpers, of whom all were broken in to the work in the railway repair shops.

These men are classed as iron workers and they are included as part of the tin-, pipe- and sheet-iron-shop force that makes repairs upon the steam locomotives, passenger coaches and electric cars that are served by the general repair shop. This force, it may be said, is drawn upon as necessity arises for repair work on the steel car bodies, so that these six men do not cover all of the work that is needed but represent only the specially trained men that have had to be developed with the introduction of the steel car. At the present time approximately 600 steel cars are cared for at the repair shop and of these about two-thirds are used in the electric zone service.

Generally speaking, the steel car on the Long Island Railroad has involved the use of a number of new hand tools but practically no new machine tools, a large cornice-brake being the only one of the latter that was needed. This was purchased for the purpose of making up sections of the thin steel, about 1/32 in. thick, that is used for the door sheathing and for the interior finish of the car.

In all cases it has been found economical to use power-driven hand tools wherever they can be operated. All riveting is done pneumatically and drilling is done either by compressed air or by electric drill. Since the new forms of welding apparatus have been available the electric welder has been used to some extent, and the oxy-acetylene flame also is used extensively both for cutting and for welding on account of its convenience in handling. In general, however, riveting is used for all heavy repair work in preference to the weld on account of its greater reliability. A certain amount of soldering is done on the light-steel sheets of which the interior finish and the doors are made up, although this is being gradually discontinued because it does not hold well, the weld being preferred for all except temporary work. The fuel-oil torch also is used for emergency repairs and where bending of heavy members has taken place. There have been several cases of distortion of the center sills, to which, on the Long Island's steel car, the center plates are attached, there being no real body bolsters. Under these circumstances it has been found possible to heat the sills in place, and either jack them or hammer them into alignment.

The sand blast is used to a limited extent, but whenever rusting of any part of the framework of the car has taken place the blast is applied only locally to clean off the surface and leave it in suitable condition for inspection and repainting of the metal underneath.



LONG ISLAND STEEL CARS—VIEW SHOWING END OF SHEET-IRON SHOP ASSIGNED TO TINSMITHS' WORK

CHARACTER OF ROUTINE REPAIR WORK

Aside from painting, which it may be said costs about the same for wood as for steel on the Long Island Railroad, the routine repairs for the framework of the steel car bodies are almost negligible. This, however, is not intended to include that which may be classed as car-body equipment, such as doors, door-operating mechanisms, windows, interior trim and the like. In general the actual cost of any job, such as reflooring platforms or renewing doors, is cheaper with wood than in steel, but heavy repairs are required more often on the wooden cars, and this offsets the cheaper repairs.

The repairs to some types of the steel doors constitute a very material item of the routine repair expense, as it has been found that rainwater works down between the glass and the beading at the lower edge of the door sash and is trapped in the space between the

two thin sheets forming the door stiles and door rails. The result is that rusting occurs from the inside of the door outward, appearing at joints or at the edges of the panels or other places where the metal is subject to distortion or vibration. Approximately speaking, twenty-five doors have to be rebuilt by being equipped with new stiles and bottom rails in the course of a year, owing to deterioration from this cause.

A certain amount of work also is done on the steps, which are subject to damage owing to occasional contact with obstructions inside of clearance lines. The steps, including the treads, are made up by hand in the sheet-iron shop, the frames being flanged as required over a form. About fifteen step replacements are required during the course of a year, and about two dozen new step-treads also are required.

Very little heavy repair work is required in the course of the routine repair work. Side sheets, however, are occasionally damaged by contact with obstructions, about two such repair jobs being required in twelve months. These repairs are made by cutting off the rivet heads and punching out the rivets that hold the damaged section of side sheathing to the posts, sills and belt rail and riveting on a new sheet in its place. Three or four cases of leaking roofs also occur during the course of a year and these are repaired by oxy-acetylene welding after determining the location of the leak by removing the headlining. Fifty of the earlier cars have the roof joints riveted and soldered, and in these each joint was provided with a cover piece in the form of a U-shaped strip of metal to provide for expansion and contraction of the roof. These joints have not given any trouble, but all later car roofs have welded joints.

A certain amount of deterioration of the sheathing of the vestibule corner and end posts occurs through rusting at the floor line. Rusting is accelerated at this point because of the salt solution that is tracked onto the platform by passengers during the winter owing to the use of rock salt for melting ice on station platforms and steps. It should be noted that the cars have trap-door vestibules in which the trap doors are down for the greater part of the time, so that corner posts are subject to the above-mentioned action of salty water during the winter to about the same extent as the vestibule center posts. The same cause has produced extended rusting of the platform sheathing and platform sills of the earlier cars, but this does not appear on the later cars which have heavier platform members.

The trap doors for one of the several orders of steel cars were made up of flanged steel plates filled with monolith cement, this being covered with a rubber tread, and it has been found that the cement, when in contact with water, produced a salt which caused rapid deterioration of the steel frame. In consequence, the railway company is making a regular practice of replacing all of these trap doors with new ones that are made from diamond tread steel plate and that have no filling of any kind, the edges of the plate being bent over on a form to provide additional stiffness. At present, in fact, two men are working steadily upon the manufacture and installation of the new trap doors.

The floors of the Long Island cars, it may be said, are made up of ferro-inclave plates of Toncan metal that is also covered with monolith cement, and it is known that the same rusting is taking place on the floors as on the trap doors. The action, however, is not so rapid in this case and it is expected that the floors will last as they are for some time to come.



LONG ISLAND STEEL CARS—PASSENGER CAR CORNERED BY FREIGHT TRAIN WITHOUT HAVING GLASS BROKEN EXCEPT AT POINT OF IMPACT

In painting the steel cars about the same process is followed as with the wooden ones. Somewhat less work is required for the filler coats of the former, in fact, because of the smoother and more regular surface upon which the paint coating is spread. Until some two years ago, however, the interior painting of the steel cars displayed a marked tendency toward the development of numerous fine cracks which detracted materially from the appearance of the surface. This was traced to the practice that had been developed in wooden-car painting wherein a hard, quick-drying varnish was used for interior work. The hard varnish was insufficiently

elastic to meet the exaggerated expansion and contraction that was inevitable with steel sheathing on railroad cars owing to their exposure to sudden and extreme temperature changes, and the result was a checking of the film of paint.

For this reason the Long Island Railroad has used "Valspar" varnish on its newer coaches, both inside and out, because of its extremely high elasticity. The cars that have been varnished with the new material have been in service for about eight months, and as no sign of checking has occurred, notwithstanding the fact that the service has extended over one winter, it is believed that this has solved the difficulty.

UNUSUAL REPAIRS

Owing to the high degree of efficiency under which operation is conducted on the Long Island Railroad, as well as to the sufficiency of the steel car equipment, the matter of unusual repairs, as distinguished from the routine involved by normal wear and tear, comes up but seldom, and very little experience has been attained along these lines. The engraving on page 568, however, shows the result of a steel passenger train running into the side of a stationary freight train at a speed of about 15 m.p.h. This crushed in the corner of the first car of the passenger train and slightly damaged the platform of the next car. The leading truck of the first car, however, was pushed under the car, breaking off all of the electrical equipment mounted on the underframe, and at the same time the truck itself was damaged to such an extent that it had to be replaced. Including all of this the cost of the repairs amounted only to about $3,600. The time that elapsed until the repairs were completed was just two months, and this included some five weeks' delay waiting for new pressed-steel pieces to be furnished by the manufacturer, the actual work of replacement taking less than three weeks. These parts, it may be said, could have been made by the railroad company, if necessary, although at a considerable expense because of the fact that they would have had to be formed by hand instead of being pressed. Equipment for pressing out parts, such as installed by the manufacturer, manifestly would be unprofitable for the railroad company to install owing to the extremely infrequent use for it.



LONG ISLAND STEEL CARS—RESULT OF USE OF REINFORCED VESTIBULE POSTS, THIS CAR WITHSTANDING DIRECT IMPACT AT 50 M.P.H.



LONG ISLAND STEEL CARS—PAIR OF 40-TON ELECTRIC CAR HOISTS INSTALLED FOR DISMANTLING STEEL CARS

The conclusion drawn from this collision was that the body end-sheet, which had been expected to tie the roof and the floor of the car together, tore loose and permitted the corner of the car to be crumpled up. The main point of weakness, of course, is the pocket for the side door of the vestibule, these doors sliding back and forth in the manner customary with rapid-transit equipment and not swinging in accordance with steam road practice. In consequence, the company decided to rivet the body end-sheet more securely on later cars and to provide additional vertical reinforcement at the vestibule ends. In this particular case the repairs were effected by cutting out the damaged side sheets at the first joint back of the crumpled portion, and by replacing the sheet together with the cast-steel end sill, the vestibule corner post, the body corner post and the roof sheets over the vestibule.

As a consequence of the above-mentioned decision the more recent steel cars purchased by the company were built with 9-in. channels flanking the vestibule end posts. As yet there has been little definite experience with the strength of the reinforced design because of the general absence of collisions. However, in the one case in which the new design has been tested it gave striking evidences of strength. This is shown by the accompanying engraving, which gives a front view of a car with the heavy vestibule posts after it had hit a car of the original design. The impact was between a two-car train moving at about 30 m.p.h. and a five-car train moving at about 20 m.p.h. Considerable damage was done to the car with the lighter end construction, and it had to be repaired by having the end cut off and having a new end built on in its place. The side sheets were cut at the joints nearest to the line where the car was undamaged, and the center sills, side sills and belt rails were spliced with riveted joint plates.

It should be noted that the car that received the least damage was a combination baggage car without a plat-

form at the end where the impact took place. In consequence, the corners were supported directly by the side sheathing as there was no drop step between the body and the end sill, such as was the case in the opposing car. It is an interesting fact that the center sill of the opposing car was not crumpled, but was bent up slightly instead. This sill was projected into the baggage compartment of the car with the heavy end construction, between the vestibule centerposts. These stripped the end sill and other projecting members from the center sill, indicating that the columnar strength of the center sill exceeded the strength of attachment of the transverse members connected to it. The center sills are built up of two 9-in. 15-lb. channels spaced 16¾ in. apart, with a top plate ¼ in. x 26 in. and two bottom plates ⅜ in. by 24 in. For 26 ft. at the middle of the car only one bottom plate is used.

This great strength of center sill is largely due to the previously mentioned fact that the Long Island Railroad steel cars are constructed without body bolsters. Instead, there is the box-girder center sill which is framed into the body end sill and which extends beyond it to support the platform. The center sill is also framed into a crossing, called a cantilever, that is located several feet back of the position normally assumed by the body bolster. The center plate is fastened to the center sill midway between the body end sill and the cantilever. and, therefore, the center sill acts as a beam extending between the cantilever and the body end sill. The primary object sought by this construction is the rigid support of the overhanging platform and draft gear, and, judging by above-mentioned experience, this object has been fully attained.

CONVENTION OF THE A. R. E. A.

At the Chicago Meeting of the American Railway Engineering Association There Were Presented Committee Reports on Electricity, Ties, Wood Preservation, Fences and Other Subjects

Those reports of particular interest to electric railways which were presented at the sixteenth annual convention of the American Railway Engineering Association, have been abstracted and are published herewith. The convention was held at the Congress Hotel, Chicago, March 16-18, 1915, and, as has been the custom, the National Railway Appliances Association held its exhibition in the Chicago Coliseum and Armory during the same week.

Roadway, Track and Ties

The committees on roadway and track reported progress, the latter stating that a sub-committee had held a joint meeting with the standardization committees of the Manganese Track Society and the Manganese Steel Foundry Society and had adopted their recommendations for special work specifications. In order that the costs of treated and untreated ties could be compared on the same basis, the committee on ties recommended several formulas for adoption and publication in the manual. These included a method of calculating the total annual cost of any tie when the following factors were known:

C = first cost of tie in place;
R = rate of interest;
n = life of tie in years.

$$\text{Total annual cost} = \frac{CR(1+R)^n}{(1+R)^n - 1}$$

Wood Preservation

The use of coal tar in creosote was considered by the wood preservation committee to be desirable. Commercial and economic conditions made advisable the conservation of the creosote supply, and one of the most feasible means of augmenting the available output of domestic creosote was by the proper addition of refined coal tar. Solutions of refined coal tar and creosote properly mixed and filtered were superior to ordinary mixtures of refined coal tar and distillate oil, and did not reduce the depth of penetration.

Allowable limits of water in creosote were also investigated by this committee, and as a result it recommended the adoption of specifications stating that the use in treatments of creosote containing up to 3 per cent water was permissible. Where the quantity exceeded 3 per cent, proper allowance should be made, and under no circumstances should timbers be treated with oils having more than 6 per cent water.

The report of the committee on buildings included recommendations regarding the best uses for various kinds of roofing materials and sketches of typical floor constructions for shops. Under the subject of roof materials, it was stated that the built-up roof was especially valuable for flat surfaces and could be made as heavy as desired. Regarding ready-made roofing, the report stated this has a better value for steeper roofs than for those of small pitch. It averaged much cheaper than the built-up type and most of those now in use required occasional recoating to obtain a fair life. Slate made a good roof if properly watched but it could not be walked upon without danger to the slate. Tile of good quality gave equally good results and had not the disadvantage of breaking so easily under foot. Its principal value, however, was from an architectural standpoint and when properly protected and fastened could be recommended for roofs with pitches of 6 in. to 1 ft. or more. Asbestos shingles were also recommended for railroad structures. Large cement tile, reinforced and laid without sheathing directly on the roof purlins, was regarded as a good roof for shops and freight houses. Owing to the high cost of maintenance, the average metallic roof coating was not recommended on permanent buildings.

Fences and Crossings

The committee on signs, fences and crossings presented data on the economy of concrete and metal as compared with wood for fence posts, which had been collected from seventy-two roads, and it was concluded that their use had not yet passed the experimental stage so far as life was concerned. General results, however, had been sufficiently satisfactory to cause a number of railroad companies and private concerns to construct plants for the manufacture of concrete posts on a large scale. Where suitable timber was plentiful and cheap there was no economy in the use of concrete unless its life was much longer than is now estimated.

This committee's report also contained the following statements regarding galvanized wire fencing: The rapid deterioration of modern woven galvanized fence wire is caused by the coating of zinc being too thin and of an uneven thickness. A second coating of zinc should be applied to electrically welded fencing after it is manufactured. For right-of-way fences a hinged metal gate is recommended. The width of farm gates should not be less than 12 ft., depending upon the size of agricultural machinery in use in the vicinity, or as required by the laws of the states through which the railroad operates. The minimum height of farm gates should be 4 ft. 6 in. from the surface of the roadway. Farm gates should be hung so as to open away from the track, and, if hinged, should swing shut by gravity.

Concrete for fence posts was stated to be a practical, economical and a suitable substitute for wood. Reinforcements for them should be placed as near the surface as possible, ½ in. from the surface being the best location. Posts should taper from base to top and should not be less than 5½ in. at base and 4 in. at top.

Concrete should consist of one part cement and four parts of run of pit gravel; or one part cement, two parts sand and four parts crushed stone of low absorption, or screened gravel. Gravel or crushed stone should not be less than ¼ in. or more than ½ in. in size. Concrete should be of a quaking consistency. Molds should have a jogger or vibratory motion, while the concrete is being placed to compact it and smooth up the surface of the post.

Concrete posts should not be made outdoors in freezing weather. They should not be exposed to the sun, and, to aid curing, should be sprinkled with water the first eight or ten days after being made. Molds should be carefully oiled or soaped to prevent concrete sticking to them. Posts should be cured for not less than ninety days, when cured naturally, before being set or shipped and should be carefully handled and packed in straw, sawdust or other suitable material for shipment.

This committee's report also contained the following recommendations regarding track construction and flangeway at paved street crossings and in paved streets. (1) Treated ties should be used, laid on a bed of crushed rock, gravel or other suitable material, not less than 8 in. in depth, placed in about 3-in. layers, each to be thoroughly rammed to compact it. (2) Vitrified tile drains not less than 6 in. in diameter, with open joints, leading to nearest point from which efficient drainage may be obtained, or with sufficient outlets to reach sewers or drainage basins, should be laid on either side of and between tracks, parallel with ballast line and outside of ties. (3) Girder rail of 141-lb. weight and 9-in. depth or similar section, with suitable tie-plates and screw-spikes, should be used. Tracks should be filled in with crushed rock, gravel or other suitable material, allowing for 2-in. cushion of sand under finished pavement. (4) Ballast should be thoroughly rammed as it is installed to prevent settlement of paving foundations. Two inches of good, sharp sand should be placed on top of ballast. (5) Paving must conform to municipal requirements, granite or trap rock blocks preferred. Hot tar and gravel should be poured into the joints as a binder.

GRADING OF LUMBER

The committee on grading of lumber found that the rules which were adopted several years ago for Northern pins and hemlock were no longer standard. It had been found wholly impracticable to purchase lumber under the rules at present printed in the manual, and the committee unanimously recommended that they be rescinded. With the co-operation of the Northern Hemlock & Hardwood Manufacturers' Association, a new set of rules were drawn up for hemlock and were presented as information. The committee also stated that the grading rules for Southern yellow pine did not sufficiently define the quality of the wood, and that there was no practical means for definitely distinguishing between long-leaf pine, short-leaf pine and loblolly pine after timbers had once been manufactured from the trees. It was recognized, however, that it made little practical difference from what species of pine a structural timber was cut, so long as certain density requirements were met. In view of these considerations it had been proposed that the rules for the grading of yellow pine timber be revised. This work had been undertaken by the committee on grading of timbers of the American Society for Testing Materials, which was working jointly with the various manufacturing organizations interested.

REPORT ON ELECTRICITY

The work of the committee on electricity was largely that of reconciling the differences between this association and other associations interested in the subject of clearances, standard specifications for overhead transmission line crossings and the study of electrolysis. During the year the committee investigated the question of modifying the limiting clearance line for rolling equipment so as to give additional space for automatic train stops or other permanent way structures. Out of a total of 196 replies to inquiries, 140 showed no encroachment on the proposed clearance diagram, and the information covering the encroachments reported had been included in the diagram. This information, together with the proposed clearance diagram, has been laid before the American Railway Association and the American Electric Railway Engineering Association and will come up for adoption at their next meetings. The diagram in question was shown in the ELECTRIC RAILWAY JOURNAL for Oct. 12, 1912, on page 857. The committee asked for the adoption of the diagram as recommended clearance lines for equipment and permanent way structures adjacent to third-rails and for third-rail structures. It also recommended the adoption of specifications for crossings of wires and cables of telegraph, telephone, signal and other circuits of similar character over steam railroad rights-of-way. The committee also recommended the adoption of the revised edition of the specification for overhead crossings of electric light and power lines, with the understanding that the national joint committee would take up the question of additions or changes in this specification previously suggested by this association at its 1912 convention.

The committee on ballast recommended a ballast section with 24-ft. roadbed for single track on tangents. Slopes should be sodded up to the top, but not beyond. Regarding the proper depth of ballast of various kinds to insure uniform distribution of loads on the roadway, the committee again unanimously recommended the test outlined in the 1913 and 1914 committee report.

Carbon Brush Troubles

At the Cleveland A. I. E. E. meeting which closed yesterday E. H. Martindale, engineer National Carbon Company, discussed the subject of commutation with particular reference to the brushes of stationary machines. He suggested the use of lead pencils from 2*B* to 8*H* for testing brush hardness, stating that a pencil softer than the brush will mark it, while one harder will scratch it. He did not specify the hardness suitable for each class of service. He recommended for railway motors brush pressures of from 4 to 8 lb. per square inch and one-half these values for stationary machines.

Mr. Martindale divided the causes of brush trouble into five classes, thus: Field; armature; commutator, including brush rigging; external electrical, and external mechanical. He listed the evidences of trouble in each case as a means of diagnosis and suggested the corresponding remedies. In connection with commutator slotting he advocated undercutting the mica about 3/64 in., cautioning against leaving strips or particles of mica flush with the commutator. On slotted commutators brushes with no abrasive action may be used and their use will result in long life of the commutator and brushes. A non-abrasive brush is not necessarily a soft brush, as one of the hardest brushes made in this country is rapidly becoming standard.

Interstate Commerce Commissioner C. C. McChord is authority for the statement that in twenty years the trespassers killed on railways in the United States totaled 86,733 and the injured 94,646, or 181,379 casualties in all, equal to the entire population of the city of Columbus, Ohio.

COASTING RECORDERS IN NEW YORK

The Number of Kilowatt-Hours Required for Standard Cars on the Third Avenue Railway Has Been Reduced for One Month as Much as 10 Per Cent—Accidents Also Show Big Decrease

EARLY in 1911 the Third Avenue Railway System, New York, installed 100 coasting recorders on its Broadway line, choosing that route in order to try out this device under the most unfavorable conditions. As the sequel shows, the company was right in its preliminary analysis, for to-day, with all the Manhattan lines of the Third Avenue Railway equipped with coasting recorders, the pioneer line does not show as good coasting performances as the others.

Nevertheless, the tests on the Broadway line proved so satisfactory compared with the preceding conditions that following an experience of two and one-half years the company decided during the year 1914 to equip all of its Third Avenue, Union and Westchester lines, city and suburban, with Rico coasting recorders. The sole exception is in the case of the storage-battery cars. The entire order amounted to 1100 recorders costing $110,000.

Comparative records of coasting ability were begun systematically on May 1, 1914, with the organization of the efficiency department for that object. The Broadway-Kingsbridge and 125th Street lines were first taken over, and others were added from month to month as their recorders were installed. In fact, the last suburban lines are just being added to the record system.

While it would have been possible to equip the entire system in less than the nine months actually required since the main order was placed, it was considered more economical to do it gradually and in synchronism with other car changes. During this period, in fact, the open-vestibuled cars were converted to the fully-vestibuled non-bulkhead type. Thus, the wiring for the coasting clock was installed at the same time as the circuits for the McWhirter door closing and car starting mechanism.

No additional men are required at the carhouses or shops on account of these recorders. The extra staff is represented solely by the efficiency department, which consists of the head of the department, his assistant and seven clerks for a total of 1100 recorders. The cost of keeping the records is about 1.1 cents a day per motorman.

The recorders are of the Railway Improvement Company's standard type except that they were altered slightly to permit installation upside down for the convenience of the motorman in making the registration and getting his record slip. The recorder is mounted on the archway left after the removal of the bulkheads. As it is energized only by current from the propulsion motors acting as generators during coasting periods, the possibility of false records is practically eliminated.

Manner of Making and Keeping Records

Besides operating these recorders the Third Avenue Railway System uses the terminal clocks of the same maker. Therefore, the first duty of the motorman is to record his departure from the terminal by inserting his running-time envelope in the terminal timeclock. The envelope, as reproduced, shows the division, line, run number, date, motorman's name and recorder key number. It also shows the order of the trips.

After registering his time the motorman inserts his key in the coaster. This second registration shows his badge number, card number and the "minute" position of the recording wheel. Since the total number of minutes shown does not exceed sixty, the motorman must register in at the end of every half trip, otherwise only the coasting time in excess of sixty minutes would be shown. The registration every half trip also is intentional as this forcibly reminds the motorman of the need for economical operation.

On leaving the car the motorman removes the record tape for the run and also inserts his running-time envelope in the terminal timeclock. Thus his envelope



SCIENTIFIC CAR OPERATION—OFFICE OF THE EFFICIENCY DEPARTMENT WHERE ALL COASTING RECORDS ARE KEPT AND CALCULATED



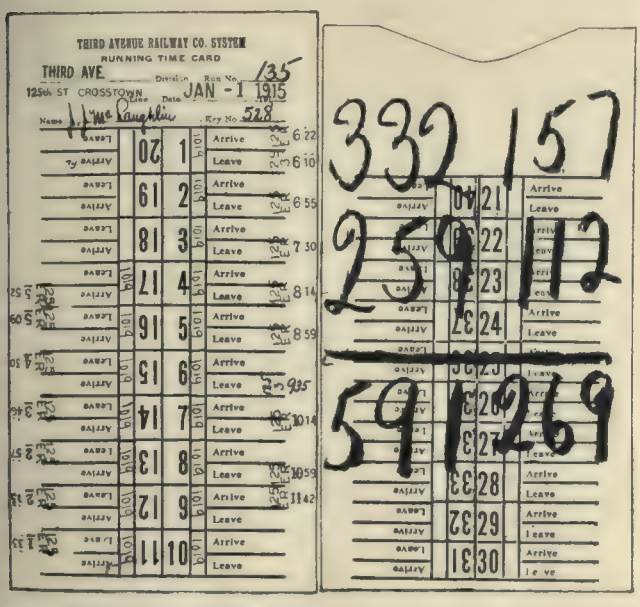
2-4-15 Car 1019 Run 135 McLaughlin B. 528		2-4-15 Car 1019 Run 135 McLaughlin B. 528	
Hours	Min.		
9	49		
Cash	511		
Transfers	126		
	637		
A 19 40	578	A 19 59	578
A 19 44	578	A 19 06	578
A 19 54	578	A 19 15	578
A 19 05	578	A 19 23	578
A 19 14	578	A 19 33	578
A 19 22	578	A 19 44	578
A 19 30	578	A 19 54	578
A 19 38	578	A 19 06	578
A 19 46	578	A 19 17	578
A 19 56	578	A 19 26	578
A 19 05	578	A 19 32	578
A 19 15	578	A 19 41	578
A 19 23	578	A 19 51	578
A 19 33	578		
A 19 46	578		
A 19 56	578		
A 19 06	578		
A 19 17	578	*Electric Ry. Journal*	

SCIENTIFIC CAR OPERATION—RINGING IN AT THE TERMINAL CLOCK; TWO TAPE RECORDS OF A DAY'S WORK

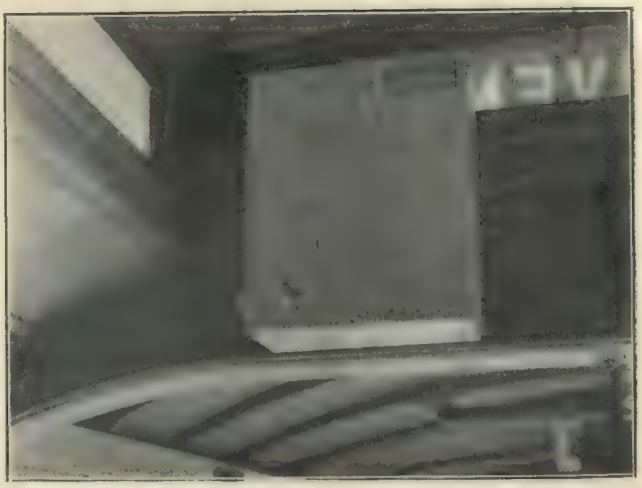
for the day bears a complete record of his running times while the tape shows the corresponding coasting times. The tape is placed in the envelope and handed to the depot receivers, who in turn forward the data to the efficiency department.

The motormen soon learn to read the tape intelligently. Their interest in the records is particularly manifest when they get a lower reading than usual. In such cases their opinion about the car is expressed by notes written on the tape in succinct if not always elegant language. On the other hand, exceptionally good records are accompanied by a phrase like "This car is a hummer." All complaints are referred to the superintendent of equipment as possibly worth special attention at the next inspection of the car.

The original tapes are filed in the daily envelope, the unstamped side of which carries the separate and totaled number of run and coasting minutes. These first additions are the only ones made without a machine. At the end of the week both sets of figures are integrated in a Burroughs machine and the percentage of coasting time is computed. The weekly record reproduced shows the motorman's badge number in the upper right-hand corner, the run-minutes in the left-hand column and the coasting minutes in the right-hand column. Both columns are added simultaneously. For the convenience of the reader the day corresponding to each performance has been added. The monthly record is similar, showing the record for each of the four weeks and the fraction remaining. The percentage of coasting time is calculated with a slide rule.



SCIENTIFIC CAR OPERATION—FRONT AND BACK OF RUNNING TIME ENVELOPE; THE BACK SHOWS THE RUN, COASTING AND TOTAL MINUTES



SCIENTIFIC CAR OPERATION—POSITION OF COASTING RECORDER ON BULKHEAD ARCH

The object in making weekly records is to give both the men and the management the chance to see the effects of weather and traffic conditions while the memory of such conditions is fresh in the minds of all. Again, the daily and even the weekly records show big fluctuations in the runs of the same man, but when compared by months the order of merit changes little so far as the regulars are concerned.

At the end of each week the records for the motormen of each line are made up in the order of merit as expressed in percentage of coasting time. The record pertaining to a given division is posted only in the depots of that division but a set of records covering every division is forwarded to the department head, the chief instructor and other executive officers interested in the effect of coasting on power, equipment, and traffic. The road instructor for each division also gets a record covering his men. This record is his guide for the investigation of operating characteristics of motor-

WEEK ENDING JAN. 7	Running Time	Coasting Time	Badge Number 52
Jan. 1	591	26	
Jan. 2	599	27	
Jan. 3	633	24	
Jan. 4	578	25	
Jan. 5	585	24	
Jan. 6	600	26	
Jan. 7	562	27	Per Cent Coasting
Total for week	4,148	183	44.2

SCIENTIFIC CAR OPERATION—RECORD DAY BY DAY

MONTH OF JANUARY	Running Time	Coasting Time	Badge Number 52
Total for Week ending Jan. 7	4,148	183	
Week ending Jan. 14	3,061	151	
Week ending Jan. 21	3,016	166	
Week ending Jan. 28	2,415	115	
Three days ending Jan. 31	1,722	86	Per Cent Coasting
Total for month	14,362	703	49.0

SCIENTIFIC CAR OPERATION—ONE MONTH'S RECORD, WEEK BY WEEK, OF RUN AND COASTING MINUTES

COASTING RECORD 125TH STREET CROSSTOWN LINE, WEEK ENDING JAN. 7, 1915.

Day Runs

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	McLaughlin	528	44.2	13	Skinner	880	33.8
2	McDermott	569	41.0	14	Martin	759	33.7
3	Lynch	599	39.5	15	Lyons	687	33.7
4	Keegan	856	38.8	16	O'Connor	600	33.3
5	McCourt	848	38.7	17	Yochman	623	32.9
6	Mullins	818	37.5	18	Conroy	512	32.6
7	Melia	886	37.1	19	Van Tassel	628	32.1
8	Murray	744	36.7	20	Greene	836	31.0
9	Jessup	871	35.6	21	Coogan	869	30.9
10	Ryan	557	35.4	22	Block	583	28.0
11	Creegan	850	35.2	23	Scanlon	769	27.7
12	Gillespie	504	34.8				

Average, 37.8; previous week's average, 38.6; highest previous average, 38.6.

Highest week's record to date: McLaughlin, 528, 47.2 per cent, week of June 14, 1914.

Relief Runs

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	Reddy	622	45.7	15	Heaney	896	35.4
2	Quinn	761	44.2	16	Girard	544	34.4
3	O'Neill	510	44.0	17	Ryan	626	34.2
4	Howe	829	42.3	18	Spellman	780	34.1
5	Lombard	740	42.2	19	Callery	561	33.7
6	Flaherty	556	39.7	20	Allen	686	33.7
7	Donohue	743	38.3	21	Mallon	552	33.2
8	Brown	587	37.5	22	Williams	809	32.6
9	McCourt	848	37.4	23	Conlon	679	32.6
10	Smith	678	37.2	24	Nasdal	573	32.1
11	Stevenson	593	36.9	25	Dwyer	736	31.6
12	Allen	830	36.4	26	Lynch	589	31.2
13	Creegan	647	36.1	27	Parks	797	30.3
14	Hogan	659	35.7	28	McDermott	750	30.1

Average, 37.0; previous week's average, 36.3; highest previous average, 36.7.

Highest week's record to date: Howe, 829, 45 per cent, week of Dec. 7, 1914.

Night Runs

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	Quinn	761	47.3	3	Audette	763	35.4
2	Hlousek	784	35.6	4	Brennan	828	33.7

Average, 41.2; previous week's average, 43.8; highest previous average, 46.

Highest week's record to date: Hlousek, 784, 50.6 per cent, week of Dec. 14, 1914.

Average all classes, 37.5; previous week's average all classes, 37.9; highest previous average all classes, 37.9.

men with supernormal or subnormal records. Formerly these instructors coached only the new men.

That the men may be compared on a fair basis the runs are classified into day, relief and night runs. In examining the weekly record it will be seen that the night runs of the 125th Street line show the highest percentages of coasting, 41.2 per cent, as might be anticipated from non-congested track. The senior motormen with day runs averaged 37.8 per cent during the same week, with the leader reaching a maximum of 44.2 per cent compared with 47.3 per cent by the best night man. The average of the relief men is 37 per cent, or only 1.8 per cent less than the day men, while the top man actually did 45.7 per cent, or 1.5 per cent more, coasting than the top day man. The weekly record also shows the premier performances of preceding weeks, the fall-back for the week of Jan. 7 being the effect of bad weather.

The monthly record which divides the men according to employment for more or less than twenty-one days per month, in addition to the classification as to runs, proves clearly enough that the ability to coast tends to improve as the motorman has more opportunities to get the "feel" of the run. Thus, despite some exceptions to the rule, it will be seen that the day men who worked more than twenty-one days in January did 3.1 per cent more coasting. The relief men of more than twenty-one days' service also did 2.7 per cent more coasting than the relief men of less than twenty-one days' service, while the night men oftener employed did 2.2 per cent more coasting.

Aside from the records already described weekly summaries with comparisons for other weeks are prepared to show the average coasting performances for each class of run on each of the five divisions. The proportion of men who have attained various percentages is also shown for each class of run and each division. A similar record is made up for the month. From this last record a summary is prepared to compare the average coasting ability of all men under each of the five superintendents, together with comparisons with other months. Thus, not only the motormen but also the superintendents are trying to improve their records. In fact, the order of merit by divisions has changed several times. At the present time Mr. Carrigan is superintendent of the West Farms lines, Mr. Murphy of the Third Avenue, 125th Street and Kingsbridge lines, Mr. Reynolds of the Kingsbridge division, Mr. McDonald of the Manhattan lines not under Mr. Murphy, and Mr. Wheeler of the Westchester division.

REDUCED ENERGY CONSUMPTION

The value of the coasting recorder is shown by the reduction in energy consumption for the last six months of 1914. It is true that during practically the same period many of the cars were changed from carbon to tungsten lighting and that about 200 cars were equipped with Perkins roller bearings. There is no question, however, that the major portion of the saving is due to the coasting recorder. Compared with the same

125TH STREET CROSSTOWN LINE—MONTH OF JANUARY, 1915.

Day Runs—Men Working Twenty-one Days and Over

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	McLaughlin	528	49.0	7	Coogan	869	36.8
2	Skinner	880	44.6	8	Van Tassel	628	36.3
3	Keegan	856	44.0	9	Criegan	850	36.1
4	Conroy	512	42.0	10	Jessup	871	35.7
5	Martin	759	38.9	11	Yochman	623	34.8
6	Gillespie	504	37.8				

Average, 39.6.

Men Working Less Than Twenty-one Days

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	McInerney	798	52.3	13	McCormack	898	34.5
2	Farrell	884	44.5	14	Murray	744	33.7
3	Lynch	599	42.5	15	Black	583	33.5
4	McCue	691	42.1	16	McPherson	827	33.5
5	Mulcahy	738	42.0	17	Ryan	557	32.5
6	O'Neill	510	41.8	18	Costello	853	32.2
7	Olsen	883	41.5	19	Mills	551	31.7
8	Reddy	622	38.1	20	Green	836	31.6
9	Melia	886	37.4	21	Manning	550	30.0
10	O'Hara	574	36.6	22	Peters	560	29.9
11	O'Connell	845	35.5	23	Mullins	818	27.1
12	Lyons	687	34.6				

Average, 37.6; average for class, 39.1; previous month's average for class, 37.1; highest previous average for class, 37.1.

Highest month's record to date: McLaughlin, 528, 49 per cent for this month.

Relief Runs—Men Working Tenty-one Days and Over

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	Howe	829	43.0	5	Girard	544	36.6
2	Brown	587	41.1	7	Mallon	552	36.5
3	Donohue	743	40.9	8	Nasdal	573	33.2
4	Williams	809	37.2	8	Parks	797	33.2
5	Allen	868	36.6				

Average, 37.6.

Relief Runs—Men Working Less Than Twenty-one Days

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	McDermott	569	47.5	14	Curry	637	34.6
2	Stevenson	593	44.5	15	Quinn	761	34.5
3	Istvanko	717	44.2	16	McBride	865	33.1
4	Keegan	856	43.0	17	Allen	830	33.0
5	Elder	874	42.2	18	McDermott	750	32.9
6	O'Neill	510	42.0	19	Ferry	536	32.4
7	McDonald	655	39.5	20	Costello	853	32.3
8	Beagon	631	39.2	21	Conlon	679	30.7
9	McGuire	673	37.5	22	Sheehy	635	30.3
10	Scanlon	769	35.9	23	Murray	744	29.8
11	Halloran	699	35.4	24	Creegan	647	26.8
12	Sullivan	627	35.1	25	Green	835	26
12	Spellman	780	34.9	26	Roche	535	24.4

Average, 34.9.

Average for class, 37; previous month's average for class, 36.3; highest previous average for class, 36.3.

Highest month's record to date: Howe, 829, 43 per cent for this month.

Night Runs—Men Working Twenty-one Days and Over

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	Hlousek	784	41.1	2	Audette	763	33.4

Average, 36.8.

Men Working Less Than Twenty-one Days

Date.	Motorman.	Minutes.	Per Cent.	Date.	Motorman.	Minutes.	Per Cent.
1	McCourt	848	44.2	4	Mooney	833	34.2
2	McDermott	569	38.2	5	Halleran	699	31.8
3	Mulkern	722	36.4	6	Lynch	589	28.9

Average, 36.6.

Average for class, 36.7; previous month's average for class, 44.3; highest previous average for class, 44.3.

Highest month's record to date: Hlousek, 784, 49 per cent for October, 1914.

Average all classes, 38.1; previous month's average all classes, 37.4; highest previous average all classes, 37.4.

WEEKLY AVERAGES

	Week Ending Jan. 7	Dec. 28	Highest Previous	Increase (+) Decrease (—) as Compared with Previous Week	Highest Previous
The averages were:					
Third and Amsterdam Avenues:					
Day runs	32.3	33.3	34.9	—1.0	—2.6
Harlem tripper	31.6	31.8	33.3	—0.2	—1.7
Relief runs	30.9	31.8	33.9	—0.9	—3.0
Night runs	33.4	35.0	37.5	—0.6	—4.1
All runs	31.9	33.0	34.9	—1.1	—3.0
125th Street Crosstown:					
Day runs	37.8	38.6	38.6	—0.8	—0.8
Relief runs	37.0	36.3	36.7	+0.7	+0.3
Night runs	41.2	43.8	46.0	—2.6	—4.8
All runs	37.5	37.9	37.9	—0.4	—0.4
Broadway-Kingsbridge:					
Day runs	35.8	35.5	36.6	+0.3	—0.8
Relief runs	35.5	35.2	36.8	+0.3	—1.3
Night runs	31.1	33.7	37.5	—2.6	—6.4
All runs	35.4	35.0	36.6	+0.4	—1.2
All lines	33.0	33.7	35.3	—0.7	—2.3

The following shows the proportion of men attaining various percentages in coasting:

	Over 40 per cent	Bet. 30 and 40 per cent	Under 30 per cent
Third and Amsterdam Avenues:			
Day runs	2	74	24
Harlem tripper runs	0	55	45
Relief runs	0	61	39
Night runs	7	67	24
All runs	2	67	31
125th Street Crosstown:			
Day runs	9	82	9
Relief runs	18	82	0
Night runs	25	75	0
All runs	14	82	4
Broadway-Kingsbridge:			
Day runs	7	78	15
Relief runs	11	74	15
Night runs	0	100	0
All runs	9	76	15
All lines	6	69	25

MONTHLY COMPARISONS BY DIVISIONS

	Month of January (1915)	December (1914)	Highest Previous	Increase (+) Decrease (—) as Compared with Previous Month	Highest Previous
Mr. Carrigan	35.0	33.6	33.6	+1.4	+1.4
Mr. Murphy	34.1	34.2	34.2	—0.1	—0.1
Mr. Reynolds	33.9	32.0	32.0	+1.9	+1.9
Mr. McDonald	30.2	31.7	31.7	—1.5	—1.5
Mr. Wheeler	29.5	33.2	33.2	—3.7	—3.7
System average	32.7	33.1	33.1	—0.4	—0.4

The following shows the proportion of men attaining various percentages in coasting:

	Over 40 per Cent			Between 40 and 30 per Cent			Under 30 per Cent		
	Jan.	Dec.	Highest Prev.	Jan.	Dec.	Highest Prev.	Jan.	Dec.	Highest Prev.
Mr. Carrigan	11	6	7	51	52	52	38	42	87
Mr. Murphy	10	8	8	75	79	79	15	13	62
Mr. Reynolds	8	6	4	52	45	45	40	49	71
Mr. McDonald	4	8	5	29	49	49	67	43	90
Mr. Wheeler	11	22	22	30	28	28	59	50	50
System per cent	8	8	8	50	58	58	42	34	73

months of 1913, the successive monthly decreases in kilowatt-hours per car-mile on the Manhattan lines are 5.5 in July, 5.3 in August, 7.7 in September, 10.0 in October and 9.8 in November. In July only 74 per cent of the system was equipped with recorders, which accounts largely for the smaller savings first shown. By December, 1914, 83 per cent of all cars covered in these power statistics were equipped with recorders.

EFFECT ON ACCIDENTS AND EQUIPMENT

No consideration of car recorders would be complete without a determination of the effect of increased coasting on front-end collisions and on the electrical and braking equipment. The reductions due to the coasting campaign alone cannot be segregated, partly because during the last half of 1914 the near-side stop was adopted and the cars were fitted with automatic starting equipment. However, for the months of September, October and November, 1914, the numbers of vehicle collisions and knock-downs on the Manhattan

MONTHLY AVERAGES

	Month of January	December	Highest Previous	Increase (+) Decrease (—) as Compared with Previous Month	Highest Previous
The averages were:					
Third and Amsterdam Avenues:					
Day runs	33.4	33.9	33.9	—0.5	—0.5
Harlem tripper	32.3	32.6	32.6	—0.3	—0.3
Relief runs	32.7	32.8	32.8	—0.1	—0.1
Night runs	34.3	36.2	36.2	—1.9	—1.9
All runs	33.3	33.7	33.7	—0.4	—0.4
125th Street Crosstown:					
Day runs	39.1	37.1	37.1	+2.0	+2.0
Relief runs	37.0	36.3	36.3	+0.7	+0.7
Night runs	36.7	44.3	44.3	—7.6	—7.6
All runs	38.1	37.4	37.4	+0.7	+0.7
Broadway-Kingsbridge:					
Day runs	36.4	36.0	36.0	+0.4	+0.4
Relief runs	36.3	36.0	36.0	+0.3	+0.3
Night runs	33.3	33.0	35.1	+0.3	—1.8
All runs	36.2	35.9	35.9	+0.3	+0.3
All lines	34.1	34.2	34.2	—0.1	—0.1

The following shows the proportion of men attaining various percentages in coasting:

	Over 40 per cent	Bet. 30 and 40 per cent	Under 30 per cent
Third and Amsterdam Avenues:			
Day runs	4	86	10
Harlem tripper runs	0	78	22
Relief runs	4	76	20
Night runs	7	70	23
All runs	4	79	17
125th Street Crosstown:			
Day runs	32	62	6
Relief runs	26	63	11
Night runs	25	63	12
All runs	29	62	9
Broadway-Kingsbridge:			
Day runs	14	70	16
Relief runs	13	75	12
Night runs	50	50	0
All runs	15	72	13
All lines	10	75	15

ENERGY USED FOR TRACTION THIRD AVENUE RAILWAY LINES IN MANHATTAN, EXCLUSIVE OF STORAGE-BATTERY CARS

	Kilowatt-hours	Miles	Kilowatt-hours per Car-Mile	Per Cent Reduction	Per Cent Coasting Mileage	Per Cent Indicated Saving
			July			
1913	3,961,640	1,154,009	3.43			
1914	3,750,273	1,157,223	3.24	5.5	74	7.4
			August			
1913	3,799,051	1,116,294	3.41			
1914	3,676,392	1,139,035	3.23	5.3	77	5.9
			September			
1913	3,699,858	1,057,012	3.50			
1914	3,571,930	1,103,653	3.23	7.7	76	10.1
			October			
1913	3,897,706	1,084,328	3.60			
1914	3,691,178	1,138,459	3.24	10.0	83	12.0
			November			
1913	3,787,303	1,065,569	3.76			
1914	3,603,024	1,061,651	3.39	9.8*	83	11.8
			December			
1913	4,164,633	1,116,650	3.73			
1914	4,085,015	1,087,478	3.75	0.5*	83	...

*The decreased saving and seeming loss are due to greater heat requirements, although the percentage of coasting improved. The average mean temperature for November, 1914, was 44 deg. Fahr. or 3 deg. less than November, 1913; that for December, 1914, however, was 32 deg. Fahr. or fully 7 deg. less than for December, 1913. The heavy drop to such a low temperature, of course, demanded the maximum heater output. Further, the precipitation for December, 1914, was 4.01 in. compared with 2.40 in. in December, 1913.

The foregoing figures are gross outputs of energy measured at the d.c. busbars of the substation.

lines were 885 and 176 respectively, compared with 1092 and 214 for the same months of 1913—a reduction of 20 per cent.

So far as car equipment is concerned, the figures for the coasting recorder installation period also show a decrease in the cost of maintenance. For motor and control maintenance alone, including, however, the mileage of the Union Railway cars, the figures per 1000 car-miles are as follows:

MOTOR AND CONTROL MAINTENANCE COST PER 1000 CAR-MILES

	1913	1914
July	$1.131	$1.324
August	1.733	1.360
September	1.631	1.607
October	2.370	1.527
November	1.700	0.985
December	1.214	1.805

MANGANESE STEEL SPECIAL WORK

Experience of Several Companies on the Pacific Coast with Solid Manganese and Insert Manganese Steel Special Work

ALTHOUGH this paper has published several articles on the experience of electric railways with solid manganese and insert special work most of the information has been based on returns from roads east of the Rocky Mountains. These data can now be supplemented by information in regard to the Pacific Coast states, obtained by this paper through its San Francisco office, and while the returns from the canvass have not been as complete as could be desired, such information of interest as could be collected is presented below.

Manganese steel has been used in track special work on the Pacific Coast under widely divergent conditions and in conformity with varied construction standards. Naturally, both satisfactory and unsatisfactory results are reported in different quarters, but as more careful observations are made and more data become available as to the effect of heavy traffic on the different types of construction, certain general conclusions have been reached, and many of the street railways are adopting certain construction standards based on their experience with solid manganese and insert special work.

Experience in Vancouver

In Vancouver, B. C., both solid manganese and insert special work have been used by the British Columbia Electric Railway, with the result that in 1911, after nine years' experience with insert special work and five years' experience with solid manganese, the decision was reached to abandon insert work altogether in favor of solid manganese. This was decided after repeated difficulties with loose plates, with arms breaking off, with chipping at point of intersection and cupping where the open-hearth rail joined the insert, while on the other hand very little difficulty and long life attended the use of solid manganese crossings in the same service.

As typical of results with insert special work manufactured by different companies, it may be cited that a certain iron-bound insert type junction was installed in 1904 under traffic amounting to 800 tons per rail per hour (eighteen-hour day). This was in bad condition six years later and should have been replaced then but was kept in service two years longer. At the end of this time it was entirely worn out and literally ready to fall to pieces under normal traffic. Between 1902 and 1909 eight junctions and fourteen cross-overs of the insert type were installed, and all showed the several types of failures already mentioned to greater or lesser degree.

In solid manganese this company has installed some fifty-three layouts of all sizes since 1906 and twelve cross-overs using solid manganese switches, mates and frogs. The traffic over these installations varies from 200 to 1550 tons per rail per hour (eighteen-hour day) and to date not a single solid manganese piece in any one of these has had to be renewed, nor is there prospect of renewal being required soon. The only solid manganese renewals which this company has ever had to make were in two steam over-electric crossings, not included in those mentioned above, where the traffic was very heavy, being 2500 tons per rail per hour (eighteen-hour day). Of the eight cross-overs in each of these two installations, which were placed in 1906, the first renewal was made in 1912, and to date a total of five pieces have been renewed in the one installation and four in the other. The points of intersection have not yet broken in these heavy traffic cross-overs, and the breaking of the casting arms which required the renewals mentioned is considered to be due to poor foundation which extends to a considerable depth and could not be improved.

The success with solid manganese work which this company has had is attributed largely to the care taken to secure solid foundations under the crossings. This work is carried out as follows: The special work is laid on ties spaced 3 ft. center to center and blocked up to grade to admit 8 in. of concrete under the ties. The concrete is mixed in the proportion of one to seven and is tamped under the ties and up to 2 in. below the base of the rail. At the same time a wood block is embedded in the soft concrete between each two ties, under the rail, with the top of the block also 2 in. below the base of the rail and flush with the top of the concrete.

This concrete is permitted to set from six to ten days, according to weather, and then the rail support is shifted to the wood block which was set in the concrete, by means of wedges driven between the block and the rail. These wedges are then bored with an auger and the rails spiked down to them and the block beneath them. This takes the weight of the rail off the ties. The spikes in the ties are then slightly drawn and the ties pounded down to the concrete bed, as the traffic will probably have caused slight vertical movement of the tie in the soft concrete while it was setting. The rails are then shimmed up on the ties with tie plates of the required thickness and then spiked in place. This method eliminates any movement as the result of installation under traffic and supports the rail on the tie and block alternately every 18 in. The remaining concrete is then placed and brought up to the required paving level.

An electric welder has been in use for about a year on the Vancouver system and has repaired insert special work with moderate success. It has been very useful where cupping in the rail head has occurred but cannot be used to repair loose arms. Points of intersection in the solid manganese crossings have not failed frequently, but in those cases where failure did occur it is reported that the welder effected a satisfactory repair.

In summing up experience with the two types of special work, the British Columbia Electric Railway has concluded that the best practice is to use solid manganese switches, mates, frogs, crossings and connecting rails for the heaviest traffic. For moderate traffic the specification should be for solid manganese switches, mates, frogs and crossings with open-hearth connecting rails, while, for light traffic, the desirable construction is regular hard cast-steel switches, mates, frogs and crossings and open-hearth rails, or built-up work of open-hearth rails.

In this summary it is also pointed out that seven separate pieces are necessary in making up a manganese insert frog of iron-bound construction and that at least four different metals are involved. Moreover, although the purpose of the insert is to eliminate wear at points of intersection, its presence really creates uneven wear

at the four points where the manganese joins the open-hearth steel because the latter wears more than fifty times faster than the former.

PUGET SOUND CITIES

In both Seattle and Tacoma the Puget Sound Traction, Light & Power Company is using for the greater portion of its special work, cast-bound manganese center construction with bolted-down, speltered-in inserts. In Seattle there are a few solid manganese crossings, chiefly at intersections with cable lines, and some standard built-up work using T-rails, the latter being the standard for steam over electric crossings. This company also uses an electric welder for building up broken off intersections and reports that it has obtained fairly successful results.

In general the insert work has proved satisfactory, but there has been some trouble with inserts coming loose, and the company would prefer solid manganese construction at the same price as insert work.

EXPERIENCE AT PORTLAND

At Portland much the same conditions obtain as at Seattle, except that the Portland Railway Light & Power Company uses solid manganese for steam-over-electric crossings and at certain intersections where the street railway traffic is particularly heavy. In general, good success is reported with solid manganese special work with a few exceptions where crossings of improper design were installed and which were later overcome by a redesign prepared by the manufacturer. For example, the crossings with the Southern Pacific Railroad at one point developed cracks in the groove at the point of the frog. These appeared soon after the crossings were installed, and some of the cracks grew to a length of 8 in. under service of less than four weeks. After two and one-half years, when the cracks had reached a length of 14 in. to 18 in., the crossing was pronounced unsafe and was replaced. On one of these castings about 4 in. of the end of one arm had broken off and, altogether, the crossings were admitted to be defective by the manufacturers and a proper allowance for this was made.

Sixteen standard solid manganese crossings were put in service by the Portland Railway, Light & Power Company at steam-and-electric intersections. Experience with these indicated that the points of the frog should have had more reinforcing metal to take the hammer blows, for six of the sixteen broke all the way through at the point of the frog when the other parts of the crossing indicated that possibly two years more wear could have been expected. It was noted in these and in other crossings that both in solid manganese and insert work the wear for the first month was greater than for the entire year following, from which it was inferred that the castings were not as hard at the surface as underneath.

A rigid concrete foundation is not considered successful under manganese crossings for heavy steam traffic, this company reports, because it has been found that the concrete may break under one part of the crossing and remain rigid under another part. In one case, this kind of a foundation failure caused an arm of the crossing to break off at the end of the casting, a break which was practically impossible to repair. Concrete foundations might be successful, it was thought, if the concrete was allowed to set for two or three weeks before operating over it, but no opportunity was found for experimenting with this theory. The most successful foundation for heavy service crossings was found to be not less than 2 ft. of well-drained crushed rock under well-seasoned 10-in. x 10-in. ties with tie plates large enough to drill and spike through, and the whole surfaced with 5-in. crossing plank shaped to fit the crossing.

Electric welding on solid manganese has not been considered a success by the Portland Railway, Light & Power Company, and this is attributed to the difficulty of getting a flux bar with enough manganese in it to obtain a proper fusion with the broken or worn parts. Arrangements are being made to use flux bars of manganese steel, with which better success is expected. However, by the use of a steel containing a small percentage of manganese, two apparently successful welds were made in solid manganese frogs which had been badly chipped at the points. Three pounds of metal were required to make the repair on each of these, and after being in service for ten months the welds were in fair shape. These crossings were on electric lines only. The usual difficulty with electrically welded solid manganese crossings has been that the metal usually parts along the line of the weld, lasting only long enough to be badly battered.

SAN FRANCISCO AND BAY CITIES

The greater portion of special work used by the United Railroads in San Francisco is of insert construction with keyed-in inserts on spelter base. Solid manganese is specified for replacements under the heaviest traffic, and for lighter service the removable centers are considered most economical. Although no fixed rule is observed in determining which type is to be specified, it may be said of their practice that where 25-ton cars pass more often than on an average of two-minute intervals, solid manganese is specified, and where the traffic is lighter than this the insert work is considered suitable.

The United Railroads have had some insert special work in service for six years which, their engineers state, gives every indication of having a total life of fifteen years. Eight years is regarded as about the minimum reasonable life for insert work. Sixty manganese insert special work pieces that failed only three years after laying were replaced by the steel company. The United Railroads have had some trouble with inserts coming loose. An electric welder is used for repairing breaks at intersections and for building up cupped-out places.

The San Francisco Municipal Railway uses solid manganese special work throughout its system, a 105-lb. rail being standard. Considerable unusually heavy construction has been put down, but most of this has been in service such a short time that conclusions as to service cannot yet be drawn.

In Oakland three types of special work are used by the San Francisco-Oakland Terminal Railways; built up T-rail construction, manganese inserts, and a few solid manganese crossings. Occasional loose plates in the insert special work are reported, and there has been some chipping off at intersections, the latter being repaired successfully with an electric welder.

SOUTHERN CALIFORNIA

For the downtown districts of Los Angeles, about 90 per cent of the special work layouts on the system of the Los Angeles Railway are of solid manganese. This company has prepared standard designs for the special work on its entire system, and double-web sections are specified on all solid manganese work, thus involving about 40 per cent more steel than would be required by manganese insert work of single-web construction. For light traffic and in outlying districts insert construction is used.

Solid manganese has been laid where the Los Angeles Railway intersects the Pacific Electric system or steam

railroads. On steam road intersections, however, there has been considerable difficulty on account of corners breaking off, and the use of solid manganese special work is being discontinued, in replacements, in favor of built-up standard T-rail crossings with a structural steel foundation set in concrete. On parts of its system, where traffic is comparatively light, this company is now specifying cast-steel body manganese inserts. Solid manganese is used, however, for most crossings, frogs, switches and mates to obviate trouble with insert plates coming loose.

The Pacific Electric Railway has prepared a standard double-web design for solid manganese crossings which is given a specially strong reinforcement. It claims that not a single failure of these crossings has occurred. On crossings of less than 40 deg. it uses the built-up type of anvil face crossings, that is, manganese inserts which are the full depth of the rail and are bound all around by rolled rail. It uses no shallow or speltered-in inserts whatsoever on account of their coming loose, and it has never been able to keep them tight for more than two or three years. All switches, mates, frogs and crossings of solid manganese under the heaviest kind of traffic have given good service when they have been reinforced in accordance with this company's standard method. The average car weighs 35 tons and in some places these are run on a half-minute service. These cars are all equipped with M.C.B. standard wheels and no risers are used in the special work flangeways. In addition to the solid manganese design this company also uses special work built up of standard rolled T-rails. Both the Los Angeles companies use an electric welder in repairing broken-off intersections with success.

The San Diego Electric Railway uses 7-in. single web solid manganese special work for heaviest street railway traffic, with frogs, switches and mates also of solid manganese. For steam-over-electric crossings it uses double-web solid manganese specials of built-up, standard T-rail construction. This company claims to have obviated trouble with the breaking off of intersections by specifying unusually high risers in the flange grooves of all crossings so as to lift the wheel treads off the rail head at these points. These risers are cast integral with the crossings and are not renewable. Their life varies with the traffic, but when they wear down the crossing does not necessarily have to be renewed.

General Summary

An analysis of the trouble which Pacific Coast companies have experienced with solid manganese and insert special work might be summed up as follows:

Most of the difficulty with solid manganese special work would be eliminated if proper foundry methods were always used and the crossings were properly reinforced. Formerly a common complaint was that castings were not properly tempered and the corners were too brittle, also where foundry work has been carelessly done, segregated metal sometimes collected at the intersections, thus weakening these points, or cracks occur in the flangeways. Recent experience would indicate, however, that the foundries are overcoming these defects almost entirely.

Insert special work seems to be very often liable to difficulty with loose plates, and engineers agree that it is usually impossible to renew a manganese plate on a spelter bearing in the field so that it will stay tight permanently. There is also the liability of arms breaking off which does not occur in solid manganese castings. The corners of intersections seem to chip off under about the same conditions in both solid and insert special work, but as the electric welder is generally reported to repair both satisfactorily, this is not so serious a difficulty as are the other two. Solid manganese and insert special work layouts are expected to have about the same life, so far as wear is concerned, when the plates remain tight.

Finally it might be said that in addition to obviating trouble with loose plates and broken arms, the solid manganese special work has the advantage that long tapering risers in the flange grooves can raise the wheels so that they roll on the flanges at the intersections, reducing the noise and lengthening the life by lessening intersection failures. With market conditions as they have been recently, the cost of standard single-web design solid manganese special work has been almost the same as for insert work where the single-web design is used, and under these conditions the preference is generally for the solid manganese castings.

Harder Rails Suggested as Preventative of Corrugation

In a paper on "Rail Corrugation and Its Causes," presented Feb. 24 before the Institution of Civil Engineers, London, England, S. P. W. D'A. Sellon reviewed different theories and investigations on the subject. In his opinion the evidence seemed to show that a comparatively small increase in the compressive strength of the steel will prevent corrugation, which he defined as the failure of the rail table under the stresses imposed upon it. The only remedy, of course, was a harder steel. The current British standard specification for tramway rails prescribed the proportion of carbon in the steel as 0.40 to 0.55 per cent, a rather wide range, of which the upper point only just encroached on the hard side for steel made by the Bessemer process, while for open-hearth material this percentage gave a comparatively soft steel.

The cold flowing of the rail surface, detruding into the groove, or to the outside of the railhead, was a general concomitant of corrugation and had been noticed as a frequent precursor of this trouble. It seemed desirable, therefore, that the rail steel should not have a high degree of ductility. It appeared that rails which conform to the British standard specification might have too low an elastic limit and too high a measure of ductility. The essential points to be specified were mechanical properties corresponding with the working stresses imposed upon the rails.

The first point was compressive strength. The British standard specification prescribes an ultimate tensile strength of not less than 40 tons per square inch, and as tensile strength and compressive strength were generally about equal in mild steel, this might be taken as the intention of the specification in respect of compressive strength. Probably steel with an ultimate tensile strength of 50 tons to 60 tons per square inch would be found hard enough to resist the destructive stresses. Neither flowing nor crushing should occur at less than 60 tons per square inch, although no figures should be fixed until proved by experiment to be adequate.

It was obvious that in obtaining the desired mechanical qualities it was necessary to avoid brittleness, to keep the metal sufficiently tough to enable rails to be curved by the usual methods and to use metal capable of being drilled. However, some additional cost of labor to secure more careful bending, and perhaps more expensive drills of special steel, could well be afforded if corrugation and excessive rates of wear could be avoided. It was probable that the tup test would have to be modified to suit steel with the desired properties, but rail breakage was so rare on street railways with a continuous concrete substructure that there was evidently a large margin of safety in that respect. Therefore, a less severe tup test should suffice. In any case, the tup test represented nothing to which the street rail was exposed in the course of its work.

ELECTRIFICATION DISCUSSED

At Meeting of Western Society of Engineers on March 16, Papers on Electric Operation of Steam Railroads Were Presented by C. A. Goodnow, W. S. Murray, George Gibbs and E. B. Katté

AT a meeting of the Western Society of Engineers held at its club rooms in Chicago, March 16, papers discussing the operating results of electrification of steam railroads were presented by W. F. Murray, consulting engineer New York, New Haven & Hartford Railroad; Edwin B. Katté, chief engineer Electric Traction, New York Central Railroad; C. A. Goodnow, assistant to president Chicago, Milwaukee & St. Paul Railway, and George Gibbs, consulting engineer for the Pennsylvania and Norfolk & Western Railways. Messrs. Murray and Goodnow were unable to attend the meeting in person, Mr. Goodnow's paper being read by E. H. Lee, vice-president Chicago & Western Indiana Railroad, and Mr. Murray's paper by E. T. Howson, engineering editor *Railway Age Gazette*. The papers by Messrs. Gibbs and Katté are abstracted on another page of this issue.

Since the electrification of the Chicago, Milwaukee & St. Paul Railway was merely under construction, Mr. Goodnow's paper was devoted largely to a description of the character of the work undertaken, all of which has appeared from time to time in these columns. He expected that the Milwaukee electrification would result in important economies not only because an entire engine division was to be electrified for the first time, but also because it would become possible to abandon the intermediate engine terminals and yards within the electric zone which had been required under steam operation. The saving in fuel was also an important factor.

In Mr. Murray's paper it was stated that more than 40,000,000 ton-miles trailing load were handled during the month of January, 1915, by the New Haven electric locomotives, this total tonnage being made up of fast, slow and local freight movements. Records of the wattmeters on the locomotives indicate that for fast freight the kilowatt-hours per 1000 ton-miles of trailing load are on the order of 30; for slow freight, 30; and for local freight, 85. These show that an electrical ton-mile requires half as much fuel as a steam ton-mile.

With regard to the handling of classification and switching yards by electric motive power, Mr. Murray said that in 1,000,000 electric switch-engine-miles there had been but one failure. The introduction of the electric engine had increased the speed of the switching yards very greatly, and this increase of speed had been secured with a ratio of electric engines to replaced steam enginees varying from 4:6 to 6:10.

With reference to the mercury-arc rectifier, Mr. Murray stated that the car which was in commercial operation on the New Haven Railroad had been giving most successful service and that it had solved the problem of the production and maintenance of the vacuum tube, both commercially and electrically. The possibilities accruing from such a result could be epitomized in the statement that while the economies of transmission by the single-phase system justified the utilization of a heavier and less efficient motive power, the rectifier to-day permitted railways not only to secure the economies gained in this transmission but to operate beneath the contact wires of such a system the more efficient and lighter d.c. apparatus. As a concrete and practical application of this result, the a.c. motive power now in use on the New Haven would be increased 25 per cent by the application of the rectifier.

With regard to administration, he said that past experience on the New Haven Railroad had shown the necessity for a complete understanding of the difference between the operation of a steam and an electric property. There was no necessity for any general change in an existing steam-operated organization, but the methods pursued in producing a ton-mile of any character upon a steam basis must be abandoned when the drawbar pull comes from electricity. The error of holding a steam master mechanic responsible for an electric engine-mile of any character is patent, and equally patent is the error of holding a steam railroad shopman responsible for the maintenance and repairs of electric engines.

Discussion

In the discussion which followed the reading of the papers it appeared to be the general belief that electrification could be brought about only by proving the economy of its adoption over steam operation on a given line. Density of traffic was the main factor that had accounted for the present development of the art, and if a traffic density sufficient to warrant electrification did not obtain, it would be folly to consider it. Regarding the electrification of the Norfolk & Western, C. S. Churchhill, chief engineer of that road, stated that the economies of electrification had been first considered in 1905. At that time electrical engineers were unable to show any other saving than that of reducing the number of men necessary to operate the trains. After a month's operation on the present electrified division it had been found that the number of men could not be reduced, but that the remarkable development in the efficiency of the electrical generating units and distribution system had made possible other savings which had been far greater and had made electrification of the Norfolk & Western particularly economical. In order to check the economy of electric over steam operation a log of steam-engine train costs for the electrified engine division had been kept, and consequently the Norfolk & Western had figures with which it might definitely calculate results of electrification.

W. F. M. Goss also took part in the discussion and stated that although he was unable to give out any information regarding the Chicago terminal electrification, he wanted to leave the thought with the members and guests of the society that the proposed electrified zone would include more track than the total miles of electrified steam roads now in existence in the rest of the world. He ventured the statement that if the Chicago terminals were electrified more electric locomotives than there were now in existence would be required.

Bion J. Arnold spoke of the remarkable development in the efficiency of the steam locomotive during recent years. The problem of electrification now resolves it-

self into one of relative efficiency of operating units or trains rather than the relative efficiency of the two types of locomotives, since they were about at par at the present time. Regarding Mr. Katté's paper and particularly referring to the operating costs, Mr. Arnold predicted that if the electrified zone of the New York Central was extended, the costs would be greatly reduced and the whole electrification would prove to be economical. He stated that the extension of the New Haven electrification had made possible greater economies. He also predicted that good results would be obtained from the electrification of the Chicago, Milwaukee & St. Paul Railway. Regarding the Chicago terminals, Mr. Arnold stated that, although he doubted the practicability of electrifying the existing terminals as an economical proposition, he did believe that if they were rearranged, systematized and grouped so that the unified property could be utilized to its fullest capacity, there would be a complete change in the aspect as regards electrification.

Others taking part in the discussion included J. C. Mock, signal engineer Michigan Central Railroad, and E. W. Herr, vice-president Westinghouse Electric & Manufacturing Company.

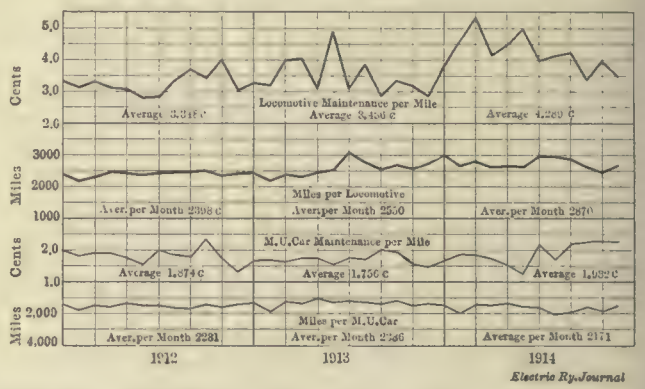
MAINTENANCE COSTS ON THE NEW YORK CENTRAL

BY E. B. KATTÉ, CHIEF ENGINEER ELECTRIC TRACTION NEW YORK CENTRAL RAILROAD

The electric locomotive service of the New York Central Railroad in New York includes switching in yards and terminals, hauling shop trains for a distance of about 6 miles, and a main line express and local service on one 34-mile division and on another 24-mile division. The average cost for locomotive maintenance, including inspection, repairs, renewals, cleaning, and painting varies from month to month, but the average cost, covering a period of eight years, is not far from 3½ cents per mile. The maintenance during the past year has been about 4 1/3 cents per mile, the increase being caused by the renewal of driving-wheel tires on the first thirty-five locomotives that were purchased.

The suburban service in the vicinity of New York City is handled by multiple-unit trains consisting of from two to eleven cars. Maintenance, including mechanical and electrical repairs, inspection, renewals, painting, etc., excluding only sweeping and window cleaning, has averaged somewhat less than 2 cents per car-mile. The cars are all-steel, 60 ft. long. They seat sixty-four passengers and weigh 57 tons. There is one motor truck under each car that is equipped with two 200-hp motors, giving a maximum speed of 54 m.p.h.

The New York Central Railroad Company has a special type of under-running third-rail, which is believed to afford greater protection from accidental contact than any other type. Its chief characteristics are, first, a wooden sheath inclosing the live third-rail, except on the bottom or contact surface, and, second, an insulated support so hung as to afford flexibility to prevent strains due to the up and down movement of the supporting ties under traffic. The cost of maintaining this protected third-rail is higher than for the usual type of third-rail, and the large amount of construction work in progress adjacent to the third-rail has increased the maintenance cost above normal. The average cost has been about $26 per mile per month on the main line and $40 for yards and terminals, including track bonding and cable connections, both positive and negative. As a general statement, it may be said that the cost of maintaining the three-phase, high-tension, overhead and underground lines is about $8 per circuit-mile per month, and the d.c. cables cost about $13 per cable-mile.



NEW YORK CENTRAL EQUIPMENT—MAINTENANCE COSTS OF ELECTRIC LOCOMOTIVES AND MOTOR CARS

The price paid for coal in New York averages from $2.50 to $3 per short ton, and power stations in this vicinity are operated on three eight-hour shifts, in place of the more common twelve-hour shifts. Under these conditions, 11,000-volt, three-phase, twenty-five cycle current measured at the busbars of the Port Morris Power Station averages between 0.45 cent and 0.50 cent per kilowatt-hour for operating, labor and materials. When fixed charges are added, the cost averages about 0.75 cent. The transmission and transformation losses, together with all fixed charges, will bring the average total cost of current, delivered to the third-rail shoes, to about 1.75 cents per kilowatt-hour.

As a measure of the reliability of electric equipment, it may be said that during the year 1914 the average

ELECTRIC ZONE TRAIN DETENTION RECORD FOR 1914. NEW YORK CENTRAL RAILROAD

Month	Train Minute Detention: Electric Power Trouble: Power Station	Substation	Trans Line 11000 Volts	600 Volts	Third Rail	22 C-Volt Signal Line	Total	Electric Locomotives: Fuses	Contactors	Reversers	Misc. Elec.	Brakes	Misc. Mech.	Total	Multiple Unit Cars: Fuses	Contactors	Relays	Control Jumpers	Misc. Elec.	Brakes	Hot Boxes	Misc. Mech.	Total	Total for All Causes	Mileage: Locos.	M. U. Cars: Electric Zone	Total	Av. Miles per Min. Det.: Locos.	M. U. Cars: Elec. Delays	Mech. Delays	Total for All Causes
anuary	11	..	..	5		35½	16	36	18	...	86	5	124	269	..	13	..	..	27	21	5	43	109	394	188,314	459,989	475,607	700	11,500	6,893	1,685
February	..	157	..		35½	192½	21	4	22	60	8	193	308	2	..	7	5	76	26½		35½	152	652½	166,740	409,701	423,680	541	4,552	6,834	905	
March	..	47	..		3½	50½	..	9	24	9	4	65	111	2	..	..	..	7½	41	22	40	112½	274	175,555	459,250	474,219	1581	48,342	4,604	2,371	
April	..	..	..	..	..	..	..	50	...	54	3	...	107	..	..	3	..	17		18½	9	47½	154½	164,136	462,703	478,300	1534	23,135	17,393	4,158	
May	3	133	..	25	14	175	4	...	60	4	19	...	87	..	5	4	..	..	48	..	3	60	322	166,034	471,724	489,234	1908	52,414	9,593	2,035	
June	..	260	..	6½	12	278½	..	..	10	65	..	14	89	..	..	..	..	2	32	95	3	132	499½	165,851	449,854	465,339	1863	224,927	3,580	1,264	
July	12	..	..	..	194½	206½	5	32	...	9	7	19	72	..	..	..	3	18	...	16	13	50	328½	185,656	441,956	461,564	2579	21,045	15,916	1,970	
August	..	..	..	3	70	73	..	..	..	41	..	37	78	3	..	..	..	..	6		13	22	173	185,659	403,266	420,018	2380	134,422	22,106	3,501	
September	..	..	..	..	..	..	..	14	12	14	..	..	40	..	..	..	3	..	..	..	13	16	56	180,548	412,802	429,728	4514	137,601	33,056	10,898	
October	..	..	..	..	13	13	5	6	...	113½	4	..	128½	..	..	..	..	12			7	19	160½	165,670	451,312	467,138	1289	37,609	66,734	3,943	
November	..	..	..	..	..	..	..	39	...	83	9	13	144	38	..	..	..	25		22	9½	94½	238½	155,860	421,944	437,350	1082	6,698	13,884	2,487	
December	..	..	..	9	121	130	..	..	..	32	..	10	42	..	..	..	..	..	62½			62½	234½	166,230	458,451	474,426	3958	..	7,591	2,732	
Total	26	597	..	48½	463½	1135	71	172	128	570½	59	475	1475½	45	18	14	11	184½	237	178½	189	877	3487½	2,066,253	5,302,952	5,496,603	1400	19,457	9,093	2,169	

Note:—Locomotives—Number of Detentions, 94; Miles per Detention, 21,981.
M. U. Cars—Number of Detentions, 108; Miles per Detention, 50,894.

mileage per locomotive per detention was 22,000, while the multiple-unit cars averaged 51,000 miles per detention. The train detentions due to electric power troubles totaled 840 minutes for the year. To this aerial lines contributed most largely, with 535 train-minutes; the third-rail caused 244 minutes' delay, and sub-stations twenty-five minutes. The power stations have never caused a minute's delay during their eight years of operation.

Mr. Katté also presented the accompanying chart and table on costs, shown on page 580, and presented views of the equipment.

ELECTRIFICATION ON THE NORFOLK & WESTERN RAILWAY

BY GEORGE GIBBS, CONSULTING ENGINEER

The Norfolk & Western Railway, an important trunk line with a large business in coal, has electrified a section of line that is known as the Elkhorn grade in the Pocahontas coal region. The tonnage on the road is very heavy, and this produces a favorable condition for electric traction. The electrified section includes about 30 miles of heavy grade along the western slope of the Allegheny Mountains and covers practically the entire gathering division for that particular coal-field.

The coal trains over these heavy grades are hauled by Mallet engines which operate only on the gathering division, three engines being required to haul the train at a speed of 7 m.p.h. or 8 m.p.h. In a tunnel on the division this speed is reduced to about 6 m.p.h., the tunnel being of limited cross-section so that difficulties with smoke have been intensified. The line is a very crooked one throughout the division. While the scheduled weight of the trains is 3250 tons now, with Mallet service, this is cut down in winter time to 2900 tons in order to get the trains over the division.

When electrification was first considered it was apparent that the use of a third-rail was impossible. That narrowed the problem to a consideration of high voltage systems, and an analysis of the cost and expense of operation resulted in the adoption of the single-phase system. On account of the enormous amounts of power which had to be applied to each train it was desirable to keep the amount of current as low as possible by adopting the highest possible voltage.

The single-phase power is converted on the locomotive into three-phase power and is used with three-phase motors. By this arrangement there is obtained the advantage of a rugged electrical machine together with a single overhead conductor, the latter being important in complicated yards and on crooked lines. The three-phase motor is not adapted to other classes of railway service, as it is essentially a one- or two-speed motor. It is not suitable for main line service requiring speed, but it is eminently satisfactory for tonnage work on heavy grades on account of its rugged characteristics.

With this system the speed of the train will be maintained irrespective of the load and the grade at any speed at which the motors are set. If the speed is exceeded by coasting down grade, with the train pushing the locomotive, the motors automatically return the current to the line at normal voltage and this power may be used in propelling trains up grade.

For this service there are provided twelve locomotives. Each is equipped with eight three-phase motors, arranged with eight-pole and four-pole combinations to produce 14 m.p.h. and 28 m.p.h. respectively. The total length of the locomotive is 105 ft. over all and the diameter of the driving wheels 62 in. The weight is 270 tons, with 220 tons on the drivers. The drawbar-pull varies from 114,000 lb. during acceleration at the 14-mile speed, to 86,000 lb. when operating at this speed uniformly on a one per cent grade, but on a recent test a locomotive developed a tractive effort in excess of 170,000 lb., indicating, however, a coefficient of adhesion which cannot be assumed in practice. The maximum guaranteed accelerating tractive effort for a locomotive is 133,000 lb.

At the present time about half of this section of the road, including the entire heavy grade division, has been operating for about a month, and the experience thus far encountered indicates that the anticipations are to be realized in obtaining a remarkably successful installation. The trains accelerate promptly and without jerking on the heavy grades. On a 2.5 per cent down grade the trains are held at a speed not to exceed 14 m.p.h. As soon as the speed exceeds the 14-mile limit the current drops to zero, then mounts up in the opposite direction and there is returned automatically to the line an amount of power probably in excess of 2000 kw.

The acceleration of these heavy trains, as regards the amount of power required, is impressive. Preliminary tests indicate a development of 11,000 hp on one train during the acceleration period and 8000 hp when running at uniform speed. These figures are probably in excess of any amount of power delivered on a single train anywhere in the world.

Mr. Gibbs' paper concluded with a brief account of the electrification of the Pennsylvania main line between Broad Street Station, Philadelphia, and Paoli, a distance of 20 miles. This installation was described in the ELECTRIC RAILWAY JOURNAL for April 18, 1914.

Electrolytic Corrosion Discussed at British I. C. E. Meeting

At a recent meeting of the Institution of Civil Engineers H. E. Gerbury outlined the general principles of pipe corrosion, with and without railway stray currents, quoting conditions in Sheffield by way of illustration. He stated that, as current density and current duration are the most important factors, potential readings are somewhat misleading. Where a comparatively high difference of potential exists there is, as a rule, less injurious current passing. This is largely due to the counter-emf of polarization. In Sheffield, when the tramway system and generation station have been shut down, differences of potential up to 0.66 volt have been observed on pipes. Incrustation in the bore of pipes is often caused by local electrolytic action. This growth might be started as a speck of rust, thus forming with the iron a galvanic couple, the oxide being electronegative to iron. The electrolyte might be created by the secretions of animalculæ or other acids. This nucleus would then establish a closed circuit, and the growth would continue by the increased bulk of oxide acting as a shell to retain the electrolyte.

Ferro-manganese and the European War

Ferro-manganese, which has come to play an important part in street and electric railway special work, frogs and crossings, is sold under severe conditions by England during the present war. English producers require that American buyers must obligate themselves not to ship steel to Germany, Austria or Turkey, or even to countries contiguous thereto except through London. It is said that some buyers have declined to agree to these stipulations, while others, because of the large amount of business on hand, have been forced to do so in order to keep their plants in operation.

RAILWAY SIGNAL ASSOCIATION MEETS

Requisites Which Were Presented for Automatic Block on Single Track Were Considered Ample for Train Operation by Signal Indications Alone

At the winter meeting of the Railway Signal Association, which was held at the Auditorium Hotel, Chicago, on March 15, reports were presented by the standing committees on mechanical interlocking, power interlocking, automatic blocks, standard designs, electric railway and a.c. signaling, and storage-battery and charging equipment. Special committees on lightning protection and contract forms also made reports.

The committee on electric railway and alternating current signaling presented a report of progress only, stating that it was bringing up to date a series of descriptions of new and extended installations. The report added that alternating current signals were increasing in number greatly and that it would be doubtful whether the committee could present descriptions of all existing installations at the annual convention next fall. Specifications were being prepared for impedance coils, and an investigation was being conducted upon the subject of inductive effect between signal circuits and adjacent electric circuits, as well as upon the hazards due to the paralleling of high-tension and low-tension lines.

The committee on automatic block included in its report a statement of circuit requisites for single-track, "traffic direction," automatic block signaling. These proposed that the control of signals should be such as to provide: (1) That stop, caution or proceed indications should be given for following movements as on double track; (2) that two trains meeting at a passing siding should first receive caution indications before reaching stop signals; (3) that protection for switches and switching movements should be given as on double track; (4) that neither a single cross nor any combination of grounds or breaks should cause the energization of the controlling or signal-operating devices; (5) that two opposing signals governing into the same block should not display proceed indications simultaneously authorizing trains to move opposing each other; (6) that two opposing signals should not display the proceed indication simultaneously authorizing two trains to move from meeting points opposing each other where operating conditions would permit.

The committee reported that it had agreed on the above requisite as a whole, but that there was, however, a difference of opinion as to the scope of the requisites. The sub-committee handling this work was of the opinion that one set of requisites should cover all single-track signaling, while a majority of the whole committee favored the application of these requisites to "traffic direction" signaling only, with another set of requisites to cover each of the automatic signal systems now in general use and known to be giving satisfactory operation. No further circuit plans had been prepared since the convention in September, as the committee considered it advisable to wait until a definite expression of opinions had been obtained from the association concerning the proposed requisites.

The chairman of the sub-committee in charge of the work offered the following additional requisite for the consideration of the association: "That the giving of a proceed signal at the entrance to a block should be dependent upon the signal governing the same block in the opposing direction indicating stop."

Discussion

During the discussion each of the above-mentioned requisites was read and discussed at length, tentative circuit plans having been presented which fulfilled their requirements. Exception was taken to requisite No. 2 because it was believed that it did not necessarily provide for a caution indication for a train at a stop at a station when an opposing train had started from a siding in advance. In response to this criticism G. H. Dryden, Baltimore & Ohio Railroad, advised that this requisite was covered in the circuits presented, which provided that when trains were actually running toward each other they first received a caution indication before a final stop signal. Mr. Dryden explained requisite No. 3 by stating that a train which was doing switching should be protected by stop and caution signals in the rear. In all cases an opposing train or a following train, as well as a train that might be using the switch, should receive correct indications by which to stop.

Requisite No. 4 was made the subject of considerable discussion and was characterized by President T. S. Stevens as the most important requisite presented. Objection to this was made on the ground that some combinations of grounds might result in a false indication under the present method of signal-line construction which provides for one common return. This point brought out the fact that the requisite provided for metallic circuits for the control of each relay. Objection was made to this because of the increased expense entailed. Some of the members were not at all sure but that a combination of grounds might result in a signal giving the wrong proceed indication even if metallic circuits were used. In explanation one of the members of the committee stated that the tentative plan designed to meet this requisite required only four line wires to be used between passing sidings, while with the present methods of signaling five are generally used. Upon this basis the expense entailed to meet this requisite was believed to be less than that required under the present method of installing signal line wires. The committee was not unanimously agreed on this clause, some believing that the requisite could not be met under all conditions. The committee as a whole, however, had approved the requisite because it wanted a scheme of single-track signaling which would be as safe as it could be made. In answer to a criticism regarding the wording of the requisite a member of the committee advised that it had been so constructed as to leave an opening for invention.

Discussion of requisite No. 5 was brief, but the consideration of requisite No. 6 brought out a number of interesting points. The first one raised was that this clause provided for a preliminary or traffic-direction feature which would mean that the first train arriving at a station would hold a train at an adjacent station irrespective of its class. This criticism, a member of committee stated, was covered by the last five words of the clause which qualified it to the extent of stating that "where operating conditions will permit." W. H. Elliott, New York Central Railroad, objected further to this requisite because he believed that signal systems should be so constructed as to permit trains to enter a block without traffic-direction control by circuits. He considered it would be better practice to leave this feature for the operating department, which could establish such regulations as it might require. Another objection to this requisite was that it might prevent the use of tracks to their fullest capacity and thus add to the expense of operation.

In response to these criticisms Mr. Dryden advised that the Baltimore & Ohio Railroad had 130 miles of single-track automatic block signaling where the siding overlap was in use. The division superintendent of the section so signaled had stated that he had experienced no more difficulty in the operation of his trains with the siding overlap after the trainmen and dispatchers had

been properly educated than if it had not been provided. This scheme was deemed desirable because it assured that trains would meet only at sidings if the trainmen disregarded orders or rules and operated only on signal indications. At this point Mr. Dryden went on record with the interesting statement that, with minor improvements, an installation such as provided by the tentative plans might be operated by signal indications alone. He believed that trains could be safely handled by the signals over single-track railroads when telegraph and telephone communication had failed. In fact, that was one of the conditions toward which the committee was proceeding.

In response to this statement it was remarked that the members of the association agreed that railroads could be operated safely with signals alone, but it was believed that this was aside from the work of the committee, which should confine its efforts to the recording of commonly accepted and known practice. One member stated that he had made a close study of the subject of siding overlaps and had decided that it could not be used except in very exceptional places without detriment to the operation of some trains. Another member stated that the recommendations presented by the committee were so far-reaching that it seemed advisable for the board of direction to pass upon them before the committee proceeded further with its work. In response to this Mr. Dryden, chairman of the sub-committee which prepared and presented the requisites, stated that he had received instructions to prepare typical circuits for single-track blocking, but in pursuance of this work had found that the method of operating single-track signaling was so different on various railroads that it was practically impossible to co-ordinate them. Upon motion at this point the association decided that the committee should proceed further along the lines set out in the requisites, but should confine itself to the work of standardizing common practice. Before closing the discussion of this subject a second motion was presented and carried which directed the committee to confine its efforts to accepted and general practice and not to delve into the realms of invention.

"ELECTRIC RAILWAY HANDBOOK"

Professor Richey's Book Has Just Been Published—Embraces Every Branch of Electric Railway Engineering

A tremendous mass of electric railway engineering data has been intelligently selected and co-ordinated in Professor Richey's "Electric Railway Handbook," just issued by the McGraw-Hill Book Company, New York. Within one pocket volume of 832 pages there has been compressed the gist of thousands of articles and papers hitherto scattered in past issues of technical periodicals and association proceedings. It would be a mistake, however, to look upon this handbook as a mere historical digest. A conscientious effort has been made to bring the facts down to date wherever possible, and in many cases the matter is absolutely new. For example, the cost data on electric shovels were supplied to the author directly by the users. Another departure from many other handbooks is that labor-saving tools and other maintenance practices have been included wherever practicable.

The scope of the book embraces every branch of electric railway engineering, except a detailed consideration of those power problems that are common to generating plants as a whole. On the other hand, adequate treatment is included of any questions that peculiarly affect railway power plants and distribution.

In the first chapter, that on roadbed and track, the author does not give the detailed calculations found in books exclusively devoted to track, but does give in a readily understood form just the data that the electric railway track engineer most often requires. He also presents construction costs and many hints on the most economical ways of handling work. The standards of electric railway track construction in many different cities are conveniently summarized in tabulated form. Rail standards and composition, rail joints, special work, steam railroad crossings and automatic switches are also taken up.

The chapter on buildings deals with a peculiarly difficult subject since so many of the existing carhouses and shops were planned before the consolidation of the local properties. The varying degrees of home manufacture by different railways and their use of steel or wooden cars also make difficult any conclusive comparisons of relative areas and layouts. However, the plans reproduced are of value even if they do no more than attract attention to some points that might otherwise have been overlooked. Included in the construction data are a number of minor but useful points on the best location of certain facilities like oil rooms, construction of trolley troughs, etc.

The next chapter, that on train movement, is evidently written for the engineer rather than for the maker of time-tables, although the factors that make up a schedule and samples of graphic interurban schedules are presented in the introduction. As a matter of fact, the greater part of this section is devoted to speed and power considerations, including studies of train resistance.

In the fourth chapter, that on railway motors, methods for comparing and selecting motors are explained. The treatment of gear ratio is particularly timely in view of the fact that some companies have found it desirable to change their gear ratios on account of changes in operating conditions. This chapter includes a discussion of shop practices and testing. The following two chapters are devoted to controlling apparatus and current-collecting devices.

In the chapter on trucks the author has presented a number of diagrams of the principal types of trucks, specifications of the A. E. R. E. A., covering wheels and axles, etc. Journal boxes and lubrication are also treated, including a description of the semicircular journal brass for high-braking pressures. This chapter is followed by one on braking, which opens with considerations of shoe pressure, rate and time of stop, and then describes the principal types and comparisons of brakeshop designs, including standardization, comparisons of hand and air brakes and calculation of brake rigging.

Under "rolling stock" the author discusses the question of weights as affecting operating costs, and describes representative types of city, interurban and rapid transit cars. Train operation, heating, lighting and ventilation are also treated. No attempt is made to take up the design of cars from the structural engineer's standpoint. This chapter also has some comparative data on locomotive design and a brief reference to motor buses.

Under "transmission and distribution" the author has taken up all forms of overhead and underground construction, including standard specifications, construction costs and a treatment of electrolysis. The final chapter is on signals and communication. This subject is developed from the simplest types of trolley contact signals to the most elaborate type for high-speed, short-headway service. Automatic train-stops, cab signals, crossing signals and the functions of the telephone are also included.

PAINTING CARS IN TWO DAYS

The Hudson & Manhattan Railroad Has Extended the Use of Baking Enamel to Exterior Painting by Developing a Portable Oven

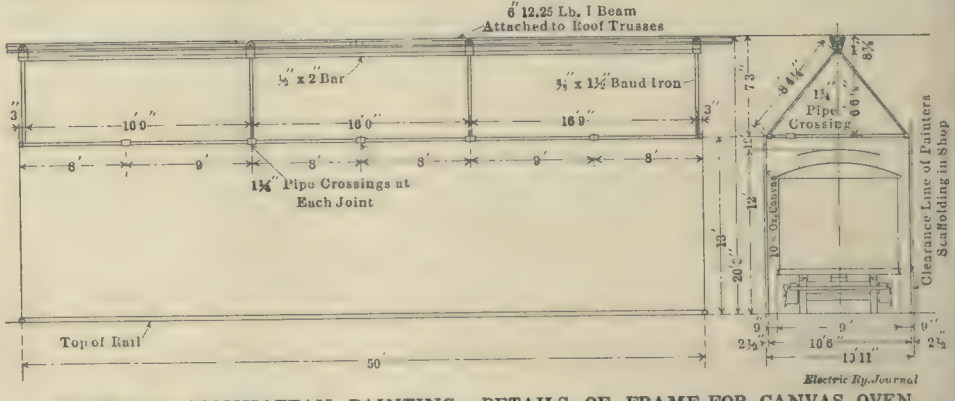
BY P. V. SEE, SUPERINTENDENT OF CAR EQUIPMENT HUDSON & MANHATTAN RAILROAD

MORE than two years ago experiments were begun by the Hudson & Manhattan Railroad with a view toward determining the value of baking enamel for painting cars. These experiments resulted in the development of a method for painting car interiors that was described in the ELECTRIC RAILWAY JOURNAL for Jan. 25, 1913, the scheme in use at that time being to close the car completely and to raise the interior temperature by means of three extra equipments of electric car heaters hung inside of the car. This plan was, of course, available only for interior painting, but sixty cars were finished in this manner in white and green enamel, and after service of more than one year it was found that the baked enamel had maintained their color and luster in spite of frequent cleaning, the appearance being considered to be much better than that which could have been obtained under the air-drying system of painting.

In view of these results, it was decided at the beginning of last summer's painting to extend the use of baking enamel to the exteriors of the cars as well as to the interiors, and several of the leading varnish manufacturers were called upon to furnish baking enamel for this service. All of the manufacturers, it may be said, approved of the decision to use baking enamel exclusively, claiming that enamel could be made freer-running than paint, and that, owing to the fact that the material could be applied in a more liquid state, it provided a much smoother and tougher surface, when hard, than did the ordinary air-drying paint which the railroad formerly used.

BAKED ENAMEL PAINTING

In order to apply the baking principle to the exteriors of the cars a 50-ft. portable canvas oven was designed to hang from an overhead framework, the latter being suspended on wheels from a 6-in. I-beam that was fastened to the roof girders. By the use of this canvas oven, which is heated by a battery of electric car heaters that are carried on low portable frames, a coat of enamel applied both to the interior and to the exterior of a car can be baked hard in about four hours. As the application of the coat requires about three hours, it is therefore possible for cars to be given two coats of enamel in one day, the nightwatchman at the shops having been trained to watch the temperature in the oven and to regulate the heat so that the oven can be operated after the painters leave. In consequence, it is possible for a car to be painted complete in two

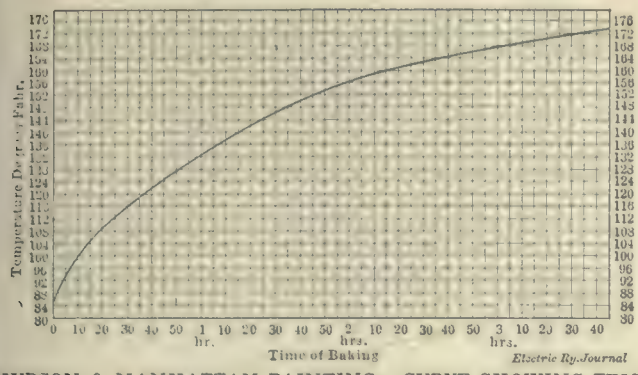


HUDSON & MANHATTAN PAINTING—DETAILS OF FRAME FOR CANVAS OVEN

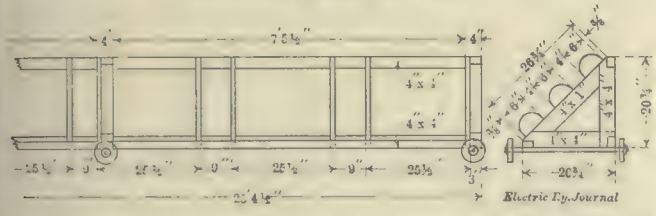




HUDSON & MANHATTAN PAINTING—VIEWS OF EXTERIOR AND INTERIOR OF CAR AFTER PAINTING WITH BAKING ENAMEL



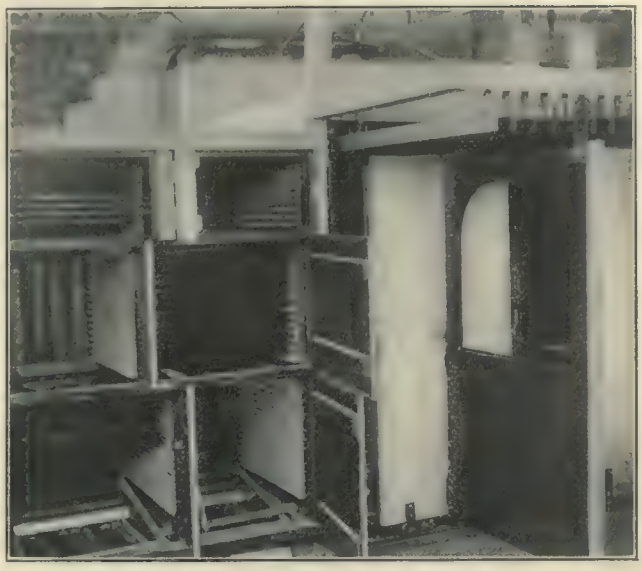
HUDSON & MANHATTAN PAINTING—CURVE SHOWING TEMPERATURE RISE IN OVEN



HUDSON & MANHATTAN PAINTING—HEATER FRAME FOR CAR OVEN

days, with the result that a large number of cars which would ordinarily be held for painting are made available for service. The cost of the oven and accessories was approximately $300.

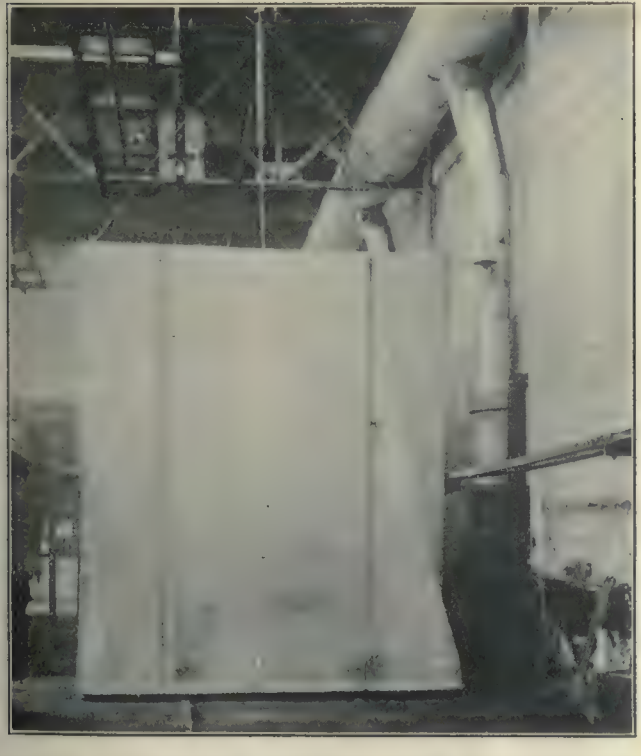
The use of baking enamel is limited to the car bodies and underframes, the trucks being painted only with such quality of paint as will serve to protect the metal against corrosion where it is not likely to be covered with oil or grease. To apply a coat of enamel over the inside and outside of a car takes approximately twenty-one man-hours. Four coats are given at each painting except for the roof, which has only three coats, and it has been found that about 1.2 gal. of enamel are required for each interior or exterior coat



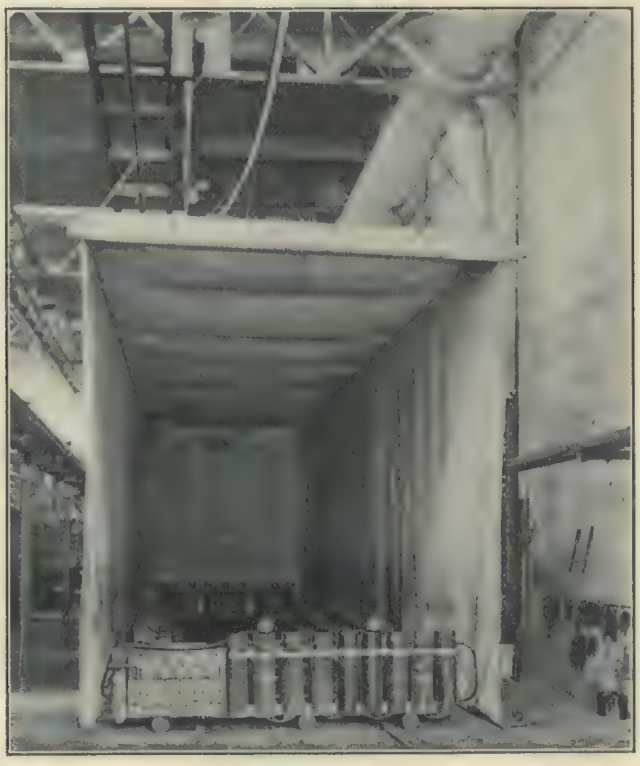
HUDSON & MANHATTAN PAINTING—SMALL BAKING OVENS FOR DOORS AND DASH

on the sides, 1 gal. covering the roof and ½ gal. covering the ceiling. The quantity of material that is used varies, of course, in accordance with the character of the enamel and its location on the car, the roofs of the Hudson & Manhattan cars, for instance, being made of a lead-covered steel, so that a special lead primer has to be applied. The exteriors of the cars are painted a solid Pullman green and the interiors are painted green with white trimmings, the ceilings being solid white. The cost of the various enamels used averages $3.50 per gallon, it being the belief of the management that high-priced paint is an economy in the end.

The temperature rise of the oven when it contains a car is shown in the accompanying curve. The readings for this were taken on a day when the tempera-



HUDSON & MANHATTAN PAINTING—VIEW OF BAKING OVEN WITH END-PIECE IN PLACE



HUDSON & MANHATTAN PAINTING—VIEW OF BAKING OVEN WITH END-PIECE ROLLED UP

ture was approximately 85 deg., and the upper part of the curve shows the extent of radiation from the sides and roof of the oven. Prior to applying the enamel, the cars thus far have been sandblasted owing to the fact that the old exterior paint has been seriously affected in spots by the salt-water drip from the tunnel in which the Hudson & Manhattan Railroad operates. The present results, therefore, apply to cars which are stripped clean of all protective covering.

Details of Process

The process has been followed of preheating the car before the enamel is applied so that positive assurance exists that the metal of the car body is hotter than the surrounding air and no chance exists that any moisture can collect to set up corrosion underneath the first coat of enamel. The pre-heating temperature has been set at approximately 175 deg. After this temperature is reached the oven is moved away from the car, and by the time the temperature of the metal surface has fallen to 110 deg. or 115 deg. the painting is commenced. By the time the coat has been applied the temperature has fallen 25 deg. or 30 deg, further, so that the car has again reached the approximate atmospheric temperature.

As soon as the first coat of enamel has been applied the oven is moved back over the car and the temperature is raised to 160 deg. This rise in temperature requires about two hours and after the baking temperature is reached the heat is maintained constant for three hours longer. These periods are based upon the requirements of a four-hour baking period, the two-hour rise in temperature being considered as the equivalent of one-hour run at the high temperature.

At the completion of the baking of the first coat of enamel, the oven is removed and the temperature is allowed to fall again to about 115 deg., when the application of the second coat is begun. After this is applied the temperature is raised to 140 deg. and maintained at that point for the equivalent of the four-hour baking period. The same process is followed for the two additional coats, making a total of four applications for each car. In future paintings, of course, it is obvious that four coats will not be required, as new priming coats will not be necessary.

During the time that one car is being painted the oven is kept in use by baking the enamel on another car, this being possible because the time required to apply a coat of enamel is roughly equal to that required to bake it. The movement of the oven is facilitated by the fact that it is hung on rollers and the heaters with which it is equipped are mounted on frames with wheels, so that they can be rolled with facility across the concrete floor of the paint shop.

Baking Oven and Equipment

The framework on which the oven is carried is made of 1½-in. pipe and ¼-in. x 1-in. strap iron, as shown in the accompanying cut. Over this frame is hung a 10-oz. canvas curtain made in a single piece 50 ft. long and 26 ft. wide, so that it extends from one side of the frame to the other. The end pieces are 13 ft. high and 10 ft. 6 in. wide, and they are sewed to the top of the main canvas covering. The end pieces are fitted with eyelets at 6-in. intervals along the edges, and the edges of the main curtain have corresponding buttons, so that the end pieces can be fastened in place while the baking is going on.

Heat is provided by seven and one-half equipments of car heaters, each equipment consisting of eighteen Consolidated car heaters. The connections are made of No. 10 wire with car-jumper plugs and sockets, so that they can be made and broken very quickly. Each equipment is supplied through a snap switch so that the temperature may be readily adjusted by cutting out groups of heaters as required. The heaters are mounted in three horizontal rows on a long wooden framework that is supported on wheels. The frame is triangular in section, having three 4-in. x 4-in. stringers extending for the full length of 25 ft. and the heaters are attached to the diagonal pieces of 4-in. x 1-in. wood. An accompanying illustration shows the construction of the frames for the heaters at the sides of the car. The frames for the heaters at the ends are similar in construction but are, of course, only 10 ft. wide. In addition they carry heaters mounted vertically along the outside of the frame.

Before the car is painted the doors and sash are removed and cleaned, enamelled and then baked in small stationary ovens located in another part of the shop. These ovens have been made by inclosing the old sash and door racks originally used with the air-drying painting system and equipping them with electric heaters in sufficient number to raise the temperature to that required for baking. It will be seen from the accompanying illustration that the door rack is arranged with runways upon which the doors are hung, the doors being given a coat of enamel and then run into the oven without the loss of any appreciable amount of heat by leaving the doors open.

COMMUNICATION

The "Jitney" Bus and Syndicated News

Georgia Railway & Power Company
Atlanta, Ga., March 15, 1915.

To the Editors:

I have read with much interest and appreciation the presentation in your issue of March 6 of the malicious activities of a newspaper syndicate bureau. Your positive treatment of this matter, both in the body of the paper and editorially, should be of benefit to the industry. I believe you have revealed much to street railway interests throughout the country.

The article on page 509 in your issue of March 13 shows that the syndicate's anti-railway campaign is still active and continuous.

There is no doubt that a great deal of good can be accomplished if railway men reply promptly and vigorously to erroneous and exaggerated statements which appear in the public press. You may be interested in an experience which I have had in so doing. A syndicated article on the "jitney" bus, written by Dr. Frank Crane, New York, recently was given wide publication. It included a quotation, made with seeming approval, of a newspaper editorial statement that "The 'jitneys' may even achieve the miracle of making traction magnates understand that there is a limit to the patience of the American people." It said also that the street railway and subway businesses have never been satisfactory; that the facilities for transportation supplied by them had always been inadequate and that people had submitted to being jammed and pushed in street cars and subways and elevated cars as if they were cattle.

I wrote to Dr. Crane, and in my letter to him I quoted these statements and then said:

> President Wilson spoke recently of "the rules of the game" that must be observed by every business, big or little, wherein moves the spirit of true sportsmanship. He was addressing the mid-year meeting in Washington of the Electric Railway Association.
>
> He spoke plain, common sense. There are rules; and if A is to observe them, B is playing an unfair game if for

his part he does not observe them. Either A's rules in the game must apply to B also, with suitable adaptation and handicap, or B's freedom from rules must be extended to A. Otherwise there can be no game, no fair play.

The game of city and suburban transportation is played by established business under the following rules:

1. The player shall take good with bad, skimmed milk with cream, misfortune with fortune. For the risk is his, as well as the reward.

2. Player shall move conveyances throughout the city. He cannot address his game to those sections where traffic is heavy and profitable without obligating himself to serve also those other sections where traffic is light and unprofitable.

3. Player shall move conveyances on fixed, regular and frequent schedules. These schedules must be followed all day and every day and most of every night, regardless of weather. This rule is inflexible, even when its observance means loss to the player.

4. Player shall furnish rides to all who apply, just when they apply. This rule shall be observed even when nobody applies.

5. Player shall exchange for one 5-cent piece a ride from any point to any other point in his field, either by direct route or by transfer.

6. Once a route is established, it shall remain thereafter forever a part of the game, and service upon it shall not be discontinued by any circumstance.

7. In exchange for the right to play the game on the city streets, player shall contribute a full proportion of the cost of public pavements in the streets, even though these streets are occupied by all others in common with him, and notwithstanding he imposes no wear upon said pavement.

8. Player shall pay to the public, the proprietor of the game, city and county and state taxes of generous figure, and also to the city a fixed portion of his gross earnings.

9. Player shall not be permitted to gain an unlimited profit. This limitation is impassable notwithstanding he is not guaranteed in any degree by anyone any profit at all.

10. Player shall furnish to his patrons at all seasons protection from the weather, in clean, sanitary, ventilated, comfortable cars.

11. Player shall qualify as financially responsible for any and all injuries or damages to person or property for which he may be adjudged legally responsible.

12. Player shall obey under penalty such regulations as are prescribed by the police. He shall stop but briefly his conveyances, and at certain points only, and never for the purpose of soliciting patrons. He shall keep his conveyances moving on schedules and routes predetermined.

In all matters not covered specifically by the foregoing rules, player shall be subject at all times to oversight and regulation by the referees, who are the authorities named by the people.

If "jitney" buses are to enter the city and suburban transportation game, should not their play be adapted to these rules?

Nobody maintains that the alternative of declaring all rules "off" should be accepted. That would bring chaos in reality. But if no fair basis of competition is established, and the public wants "jitney" buses sufficiently to make them profitable on a permanent basis, would it not be reasonable for the established street car companies, the transportation specialists, to play the game with the "jitney" buses on their own ground and under their own rules?

I have continued sending to Dr. Crane other matter presenting the company's viewpoint. You may be interested to learn that I have just received from him this letter:

> The article "Look, Then Leap," which you sent me, strikes me as good advertising. While I don't think the "jitney" bus movement can be stopped, it certainly should be regulated. I would be pleased to see what further action you are taking in this matter. Cordially, Frank Crane.

W. T. WATERS, Advertising Manager.

TERMINAL FACILITIES AT SAN DIEGO

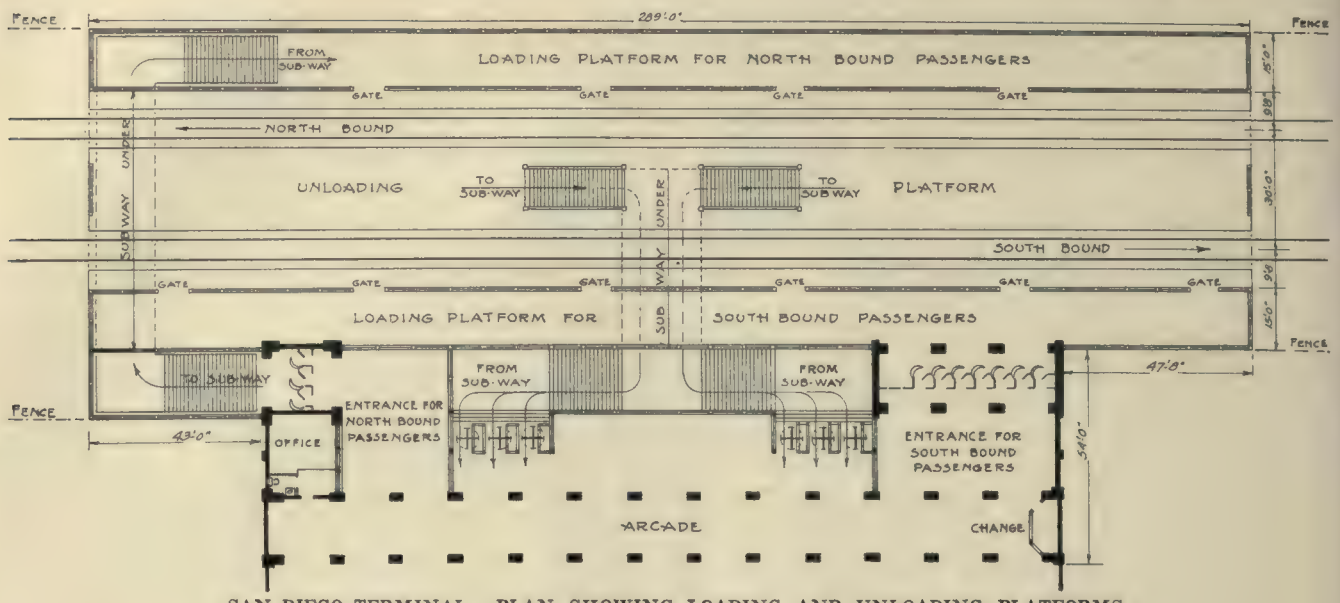
Provisions Made by San Diego Electric Railway for Handling Exposition Crowds

Many people probably do not realize that there are two large expositions in California this year, the Panama-Pacific Exposition at San Francisco and the Panama-California Exposition at San Diego. The former, being larger, is attracting more public attention than the exposition held at San Diego, but the promoters of the latter believe that there is opportunity for two large fairs of this kind in California this year. They think that few people will take the trip across the Continent to San Francisco without also visiting Southern California, and that the fair at San Diego will prove an added attraction for the trip.

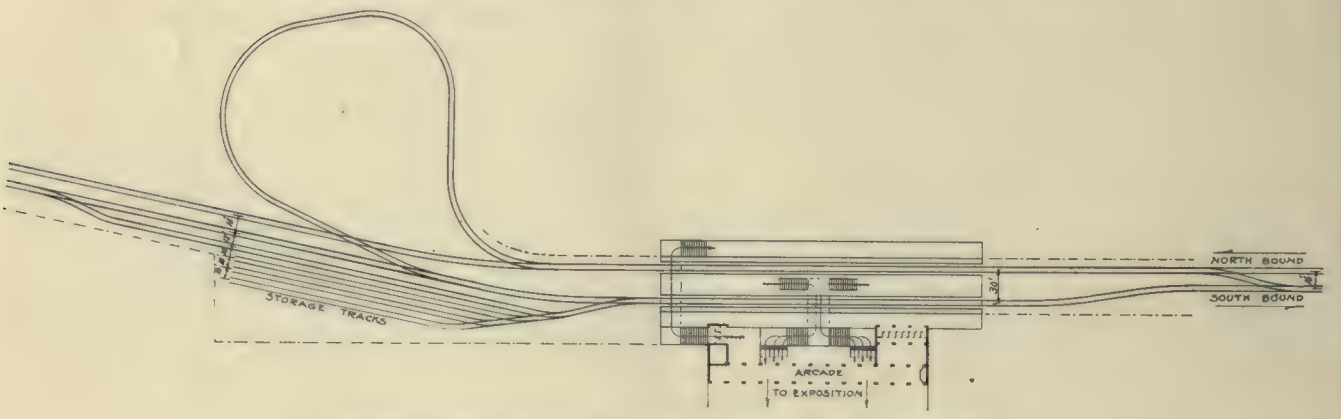
In location, the Exposition at San Diego is quite different from that at San Francisco. The latter is directly on the water. The San Diego Exposition is in Balboa Park—a large tract of land near the center of



SAN DIEGO TERMINAL—GENERAL VIEW OF PLATFORMS

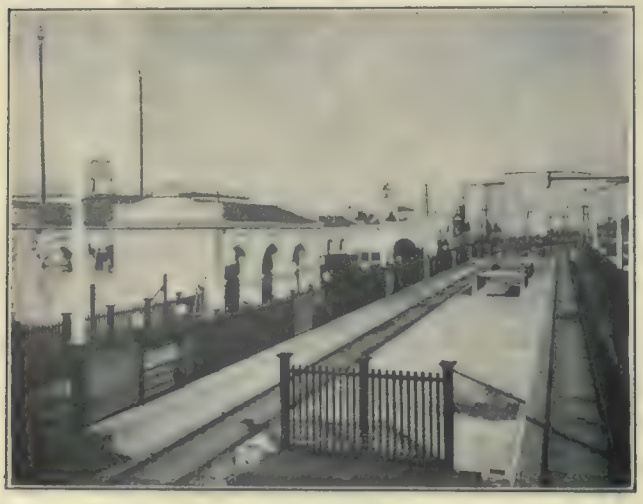


SAN DIEGO TERMINAL—PLAN SHOWING LOADING AND UNLOADING PLATFORMS



SAN DIEGO TERMINAL—PLAN OF LOOP AND STORAGE TRACKS

the city and at a considerable height above it. From the buildings can be obtained a beautiful view of San Diego Bay. The area covered by the Exposition is 618 acres. The general exhibit and main buildings occupy 100 acres, the state and foreign sections 100 acres, and the amusement features 25 acres, while 250 acres are devoted to landscape gardens and park. The buildings are in the Spanish Colonial style. The Exposition was opened on Jan. 1, and will continue for the entire year of 1915.



SAN DIEGO TERMINAL—VIEW SHOWING ENTRANCE TO EXPOSITION

The electric railway system in San Diego is operated by the San Diego Electric Railway Company, which has recently completed at the main Exposition entrance an elaborate terminal with three platforms, two for loading and one for unloading. There are separate entrances or exits to each and subways so that passengers do not have to cross the tracks.

The track is constructed of 75-lb. T-rail. All of the platforms are of sufficient length to enable the company to discharge or load at least two-car trains at the same time. The company has 76 cars equipped with the General Electric system of control which enables the use of two or more cars per train. The train which has been found to be most convenient during the rush-hours is the two-car train, and this will probably be the standard unit for the exposition period at rush-hours. Passengers unloading from the cars pass down stairways to subways and then to the inside of the grounds, passing through turnstiles.

The inclosure on the loading platform has a capacity for 2000 people, so that in case of a blockade or any serious delay no difficulty will be experienced. Electric lights are installed to show intending passengers which way they are to go. These lights are under the control of the gateman. Ample storage capacity for cars is provided by the stub tracks and loop track. These enable the company to store a sufficiently large number of cars to enable it to take care of a crowd at closing time.

The cost of the construction of this terminal was nearly $20,000 exclusive of track.

AMERICAN ASSOCIATION NEWS

Important Meetings of Rules, Block Signals and Motor Vehicles Committees Were Held This Week—Complete Sets of Proceedings Were Issued

JOINT MEETING OF RULES AND BLOCK SIGNAL COMMITTEES

A joint meeting of the block signal committee and a sub-committee of the Transportation & Traffic Association rules committee was held at the Congress Hotel, Chicago, March 16 and 17, for the purpose of revising the rules pertaining to signals. This meeting was attended by L. H. Palmer, New York, N. Y.; C. E. Morgan, Jackson, Mich.; S. W. Greenland, Fort Wayne, Ind.; J. W. Brown, Newark, N. J.; John Leisenring, Peoria, Ill.; G. N. Brown, Syracuse, N. Y.; H. A. Nicholl, Anderson, Ind.; C. H. Morrison, New Haven, Conn.; G. N. Day, Syracuse, N. Y.; H. W. Griffin, New York, N. Y.; C. D. Emmons, South Bend, Ind.; W. J. Field, *Electric Traction*, and E. M. Haas, ELECTRIC RAILWAY JOURNAL. In the absence of J. M. Waldron, chairman of the joint committee on block signals, J. W. Brown, vice-chairman, presided.

The subject of the block signal rules was considered in detail, with a view to making such revisions of the definitions and rules as were deemed advisable. It was decided that Rule 10 relating to contactor signals should not be revised, but that an explanatory note should be added restricting its application to the non-registering type of signals. Since the registering type was believed to be special, no rule was recommended for it.

Rule 554, under automatic block signal rules for train and motor crews, which relates to the procedure at signals indicating "stop," a new rule, which was believed to cover the situation thoroughly, was discussed at length and approved. At the close of the discussion of block signal rules, Chairman J. W. Brown appointed C. D. Emmons and G. N. Brown as a sub-committee to work with the sub-committee of the Transportation & Traffic Association's committee on rules to complete the work of revision.

Immediately upon completion of the work of the joint committee on block signals and the sub-committee on rules of the Transportation & Traffic Association, the former committee went into session, taking up the subjects assigned directly to it. A tentative plan on clearance diagrams for semaphore signals was submitted, criticised and revised to meet the views of the committee as a whole, as well as those of the power distribution committee. On the subject of light signals for interurban railways it was decided that the recommendations made at the 1914 convention should remain unchanged, pending the adoption of definite standards.

On the subject of operating by signal indications only, the statement was made that data sheets had been sent out to a number of companies for information and their recommendations regarding this practice, and it was found that the concensus of opinion was against this method of operation, at least at this stage of the development of the art of block signaling. One of the points raised included the delay to superior trains by inferior trains and the possibility of a complete tie-up. A statement of the opinion of the committee regarding this method of operation is being preferred.

The committee accepted the A. I. E. E. standardization rules as far as they relate to signal work.

A complete report on the subject of highway crossings and protection was submitted and, after slight revisions, was approved for insertion in its final report.

MEETING OF COMMITTEE ON OPERATION OF MOTOR VEHICLES

A meeting of the committee of the American Electric Railway Association on the operation of motor vehicles was held in New York on March 16. It was attended by all of the four members of the committee, Britton I. Budd, Chicago; Henry G. Bradlee, Boston; William A. House, Baltimore, and C. L. S. Tingley, Philadelphia. This is the second meeting of the committee, the former having been held in New York last month. The conclusions of the committee were summarized in a report to President Allen, which will doubtless be issued in the immediate future.

ISSUE OF PROCEEDINGS

Bound volumes of the proceedings for the 1914 convention were distributed this week. As for last year, they consist of six volumes. Altogether there are 2130 pages, made up as follows: American Association, 314 pages; Engineering Association, 596 pages; Accountants Association, 200 pages; Traffic & Transportation Association, 464 pages; Claims Association, 216 pages; year book, 340 pages. Besides bringing the committees and other data in regard to the association up to date, the year book contains some twenty pages of tables compiled by the bureau of fare research, largely from the 1912 census report on electric railways.

PUBLIC SERVICE COMPANY SECTION

The regular meeting of the section was held in Newark on March 18. The speaker advertised for the evening was Oscar T. Crosby, but a letter received from Mr. Crosby on Wednesday stated that he had accepted the direction of the Belgian relief work, necessitating his sailing on Saturday. A new program was immediately devised, consisting of talks by R. E. Danforth, general manager, on experiences with early railway motors and results achieved in reducing motor maintenance costs; by Alfred Green, Galena Signal Oil Company, on experiences with several types of early motors in Rochester, and by H. H. Norris, ELECTRIC RAILWAY JOURNAL, on energy requirements in starting electric cars and keeping them at speed.

This program while extempore, fitted in with the course on "Public Service Economics," and Mr. Danforth stated that the discussion of equipment maintenance cost reduction would be continued at a later meeting.

ACCOUNTANTS' EDUCATIONAL COMMITTEE

A meeting of the committee on education of the American Electric Railway Accountants' Association is called for Monday, March 22, in New York. The members of this committee, whose names have not been previously announced in the ELECTRIC RAILWAY JOURNAL, are George C. Whitney, Washington Railway & Electric Company, Washington, D. C., chairman; F. J. Pryor, Jr., American Railways Company, Philadelphia, Pa.; F. D. Lasher, Republic Railway & Light Company, New York; N. E. Stubbs, United Railways & Electric Company, Baltimore, Md., and G. H. Caskey, Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

Equipment and Its Maintenance

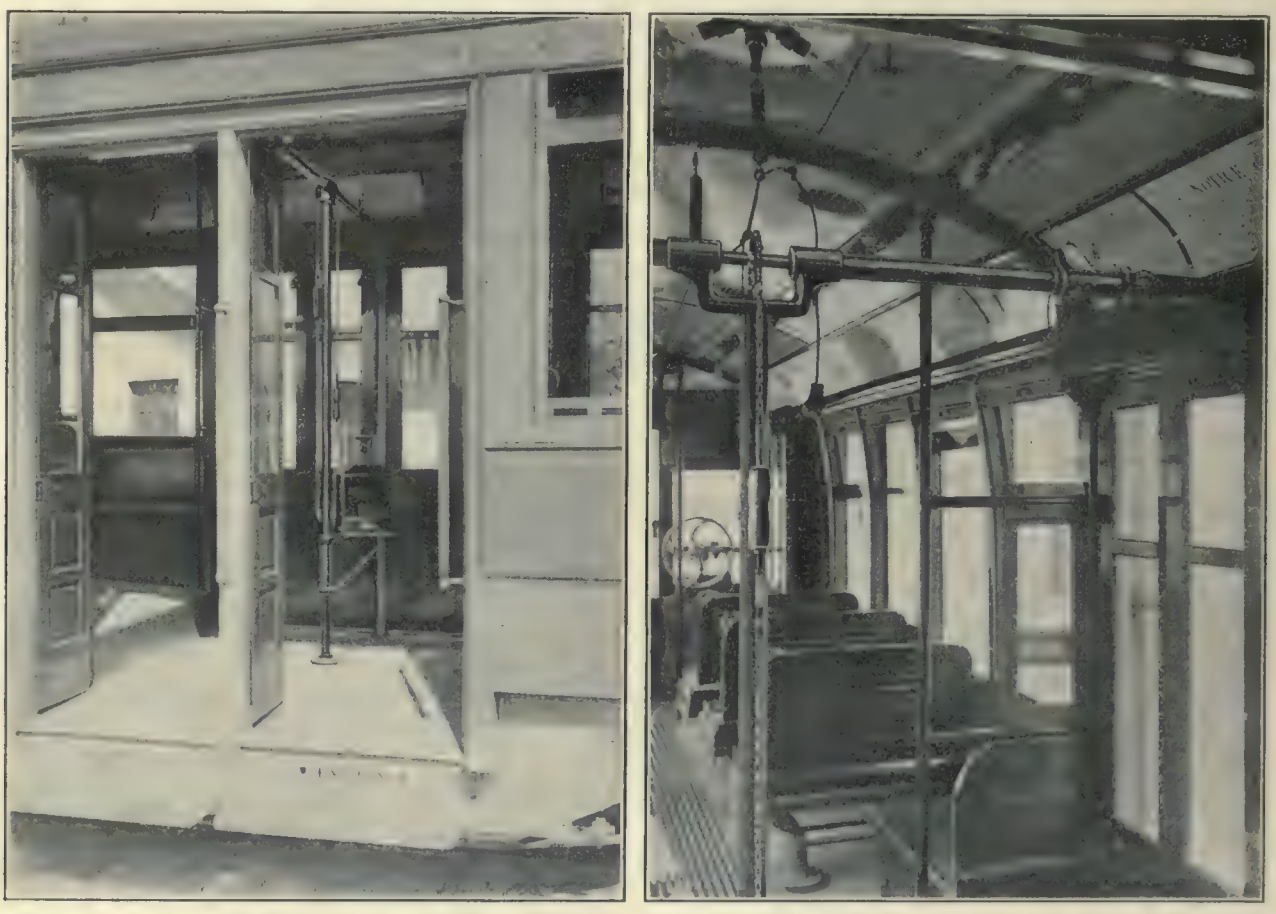
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Car-Door Operation with Sprocket Chain and Worm Shaft

BY J. N. LLOYD, MASTER MECHANIC SANTA BARBARA & SUBURBAN RAILWAY, SANTA BARBARA, CAL.

Our cars are of the center-entrance prepayment type. Originally they were equipped with wire doors but as these proved unsatisfactory the company decided to replace them with half-glazed wooden doors. For this change we designed and built in our own shops the door-operating mechanism hereinafter described. The first car, which was changed in July, 1914, gave such satisfaction that we have since converted the remaining cars in the same way.



VIEW OF SANTA BARBARA CAR AT CENTER-ENTRANCE, SHOWING THE DOOR-OPERATING CHAIN WITH HAND-HOLD FOR CONDUCTOR, SPROCKET WHEEL AND TUBING FOR CONTINUOUS SHAFT; SHORT LEVER OVER SLOT IN HORIZONTAL TUBE LOCKS ONE DOOR MECHANISM WITHOUT AFFECTING THE OTHER

There are four doors to each side of the car, two opening back to back at the center-entrance post and one at each side of the entrance bulkhead. The step works simultaneously with the doors. The doors are hinged on 1-in. door posts which have a bearing at the floor and just above the tops of the doors.

The two center-door posts extend through the floor and are equipped at the bottom with bevel gears which are in mesh with bevel gears on a jack shaft parallel with step shaft and operating step shaft by a lever.

In the center of the car is a 1½-in. pipe stanchion which has a cast fork at the top. A hollow tube runs from each side of the fork across the car to the post at the center of the entrance. Incased in these tubes is a continuous shaft which has bearings at each end of the tubes. The shaft has a right-hand worm screw on one end and a left-hand screw on the other. Each screw operates a wing nut which slides through two slots 8 in. long which are cut, one on each side of the tube, 14 in. from the door post.

Connected with each wing nut are two rods which in turn are connected to cranks, one on each center door post. From another crank on each center door post is a rod extending over and connecting with a crank on each side door post and causing them to operate simultaneously with the center doors.

The worm screw shaft extending across the car is fitted at the center with a sprocket which is caused to rotate by a continuous chain which runs over another sprocket fitted in the center stanchion 2 ft. from the floor.

The chain is fitted on each side of the stanchion with a wooden grip to enable the conductor to operate the doors by a downward pull.

To prevent the doors on both sides of the car from operating at the same time, two collars are fitted on each tube at the ends of the slots through which the wing nuts slide. Between the collars is a slotted sleeve which is caused to rotate by means of a short lever over the slot in the tube. This arrangement causes the wing nut to be locked in place when the doors are closed. To operate the doors on either side of the car, the wing nut on the opposite side is locked, and the shaft is rotated by means of the chain and sprocket. The shaft rotates through both the locked and the unlocked nuts, drawing the latter back through its slot toward the center of the car for the 4-in. of distance required to open the doors.

Trailer Wagons with Automobile Steering Gear for Vienna Snow Cleaning—Car Scraper Practice

BY LUDWIG SPÄNGLER, DIRECTOR VIENNA MUNICIPAL TRAMWAYS

For many years the Vienna Municipal Tramways has been obliged to remove all snow not only from between its rails but also for certain distances on each side of the rails and even to the curbs. This makes it necessary to have equipment which will take care of the entire width of the street. To attain this end we use a train made up of a motor service car and two pole-coupled wagons, both classes of vehicles being fitted with snow plows, as illustrated. The space between the rails is cleared by the motor car while the rest is cleared by the wagons which can be steered from side to side and around obstructions. This steering gear is of automobile type, and is manipulated by seated operators. The



MOTOR CAR WITH PLOW FOR TRACK CLEANING AND WAGON TRAILERS FOR REMOVING SNOW BETWEEN RAILS AND CURB

wagons have iron-tired wheels and are hauled at an average rate of 7.4 m.p.h., at which speed they do not make excessive noise in paved streets. Consequently they may be run in between the regular passenger cars. The trains are placed in service as soon as a storm begins and if the storm is a heavy one remain at work during its continuance.

For the more thorough removal of the snow at the rails patented Berbalk snow-scrapers for 200 to 300 motor cars are deposited at several points along the routes. As soon as snow begins to fall the cars stop at the supply depots where the scrapers are attached by their crews.

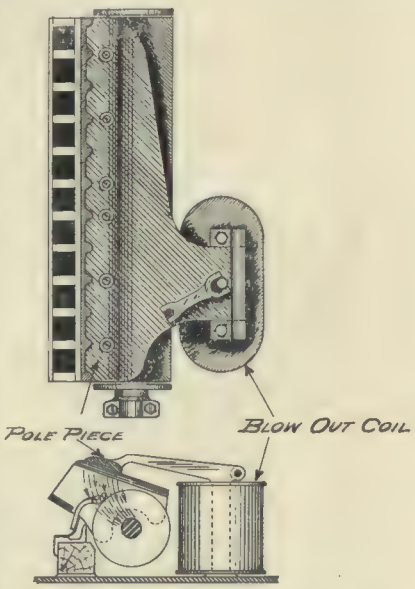
While the equipments described might prove insufficient for heavy snow conditions they are entirely satisfactory for the winters of Vienna.

Equipment Defects—Controller Blow-Out Coils—I

BY C. W. SQUIER, E. E.

It is necessary that all controllers handling large currents be provided with some means for successfully extinguishing the arc formed by the opening of the circuit at the contacts. At first mechanical devices were tried and the circuit was opened simultaneously at a number of points in series, but the great advance in extinguishing this arc came with the introduction of the magnetic blow-out. The principle of using a magnetic field to blow out an arc was first developed by Prof. Elihu Thomson. He found that an electric arc is urged out of a magnetic field and that when the circuit is broken in such a field the arc is blown out of line and is extinguished or cut in two.

The General Electric Company was the first to apply this principle to extinguishing the arcing in controllers. Its first type of controller blow-out is shown in an accompanying illustration. This consists of a blow-out coil connected in series with the main contacts and fitted with a cast-iron pole piece which extends over the main fingers and contacts, hinged to one end of the core of the coil. The path of the magnetic circuit is from the coil through the pole piece and down through the fingers and contacts to the controller shaft and frame and so back to the core of the blow-out coil. Thus a magnetic field is provided at the point where the fingers bear on the contacts, by the passage of lines of force between the pole piece and the shaft. When the circuit is opened this magnetic field causes the arc to be blown sidewise and so aids in extinguishing it. To prevent this arc from short-circuiting to the adjacent fingers and contacts, molded insulating shields called arc deflectors are inserted between them. These are fastened to the pole pieces so that they can be easily swung out of the way to permit easy access and give an unimpeded view of the contacts for inspection.

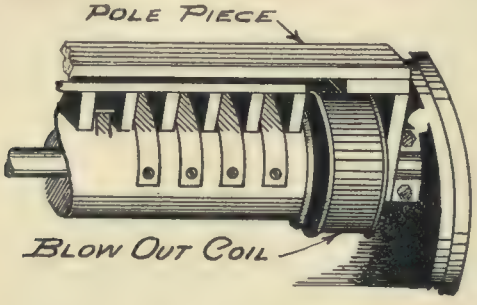


FIRST CONTROLLER BLOW-OUT

This pioneer magnetic blow-out has proved very successful for handling currents up to 75 amp, and most of the hand controllers now in service have this type in some modified form. Many other types and arrangements of controller blow-outs have since been developed, however, in an effort to provide a more efficient blow-out and to overcome some of the principal objections to the pioneer type, namely: The coil occupies much space at a point that could be utilized to advantage for connections or contacts; the stray fields are very large, so that a big portion of the lines of force is not available for blow-out purposes; the contacts most distant from the coil have a smaller magnetic field and consequently a weaker magnetic blow-out than the contacts nearer this coil; as the arc is blown sidewise against the arc deflectors it does not have sufficient space to expand properly, causing excessive burning of the arc deflector plates. Troubles with the coils themselves

have been very few and are confined chiefly to short-circuits which result from the burning of insulation, due to the floating back of the arc from the contacts or to the expansion of the coils when hot whereby the insulation is rubbed by the drum or some other moving part.

Troubles with the arc shield, which may be included as a part of the controller blow-out, are the following:



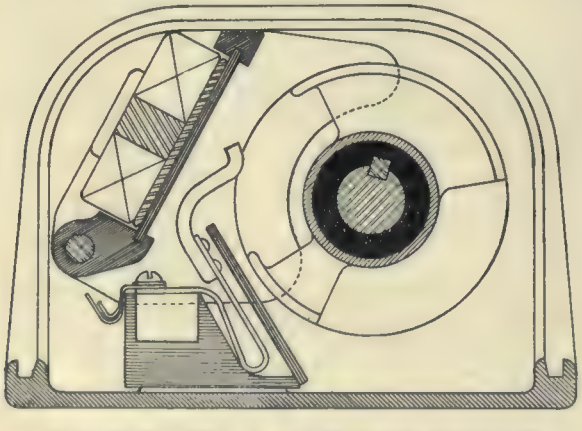
SHAFT TYPE OF CONTROLLER BLOW-OUT

Burned arc deflectors and broken or split deflectors. This splitting of the arc deflectors is due principally to the use of wood screws for fastening them together and to the pole piece.

Much attention has been given toward developing an insulating material which will withstand the severe arcing to which arc deflectors are subjected and also to permit fastening with wood screws to provide a solid support. So far, however, nothing entirely satisfactory has been produced.

SHAFT TYPE BLOW-OUT

The type of blow-out next developed may be properly termed the shaft type of blow-out. It is shown in a second illustration. In this type the blow-out coil is placed directly around the controller shaft, and a wrought-iron pole piece extends over the coil and contacts. This location of the blow-out coil at the bottom of the controller makes a very neat design and utilizes



POLE-PIECE TYPE OF CONTROLLER BLOW-OUT

the space to the best advantage. It is also remote from the arcing at the controller contacts so that trouble from burned insulation, due to this arcing, is overcome. This type, however, is still open to the criticism that the contacts at the top of the drum have less blow-out than those at the bottom and that the direction of the arc is still against the arc deflectors.

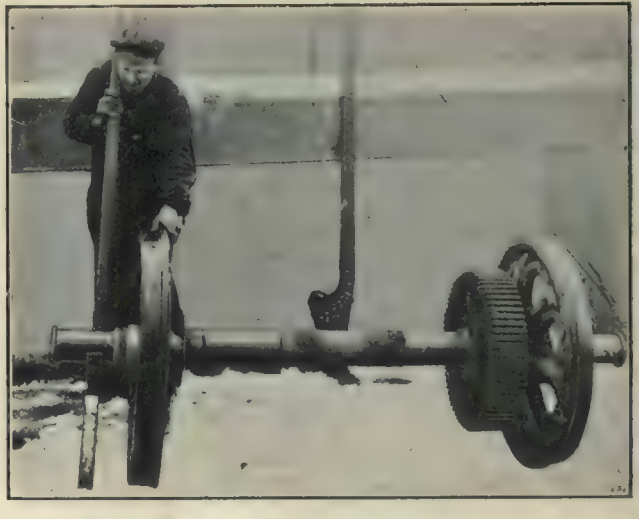
POLE-PIECE TYPE OF BLOW-OUT COIL

A third illustration shows the pole-piece type of blow-out coil which was the third design brought out. This consists of a long coil extending the entire length of the controller and mounted directly over the points where the fingers rest on their contacts. The magnetic circuit for this blow-out is from the inside of the core of the blow-out coil across the contacts to the controller shaft and then to the cover and frame and so back to the outside of the blow-out core. This blow-out is used quite extensively as it provides a uniform field for all contacts and so overcomes the objection of having some contacts with less blow-out effect than others.

All three of the blow-outs so far illustrated have the lines of force of the magnetic field passing in a direction perpendicular to the controller shaft and the arc is blown sidewise. To provide space for the expansion of this arc some controllers have been built with a space between adjacent contacts and with holes through the arc deflectors at the contact points through which the arc is blown. However, this adds to the height of the controller and so requires a disadvantageous amount of room.

Notched Stick to Steer Wheel Sets

The notched stick well known to steam railroad men for lifting wheel sets from the rails is used in the Wolf Street shops of the New York State Railways, Syracuse Lines, for moving a wheel set across the floor and steering it to the wheel lathe. The stick, which is shown in use, is made of wood except that a reinforcing strip of



NOTCHED STICK FOR STEERING WHEEL SETS

strap iron is added to prevent splitting. To steer the set the operator inserts the notched portion under the axle, lifting it, say, only 1/8 in., but this is enough to permit him to steer the set by pulling toward him the wheel on his left.

Railless Traction in Shanghai, China

The railless street cars recently shipped from England for use in Shanghai have been temporarily abandoned because of the condition of the streets on which they were operated. It was found that the wheels of the new cars were pressing down the surface stones with which the roads are paved, and it seems that these roads will have to be gone over thoroughly before the operation of the railless cars can be undertaken successfully. Aside from the difficulty with the roadbeds, the cars are said to be eminently suited for use on the traffic-packed streets of Shanghai. In the period of thirteen days during which the cars were run 200,000 passengers were carried, the cars on the streets numbering about five each day.

Ampere-hour Meters on Battery Cars

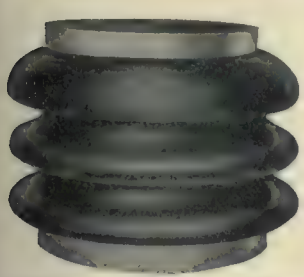
The Third Avenue Railway System, New York, now operates a total of 160 storage-battery cars, of which about 140 are in daily use. In order to show the motormen how much energy they have left in the batteries, and also as an incentive to economical operation, each car is equipped with a Sangamo integrating ampere-hour meter. On a storage-battery car, of course, the meter which records charge and discharge is a necessity since the car carries but a limited supply which, if used too lavishly, will cause the motorman to lose a portion of his day's work. Thus, a storage-battery motorman has a strong and immediate incentive to operate with economy. Should he run short of power when operating a car taken over from a morning platform man, the latter is likely to hear something to his disadvantage the next time he meets his relief.

The average weight, unloaded, of a storage-battery car is 8.25 tons. The car seating capacity averages twenty-four and the standing load may increase the total passenger load to fifty or sixty. The capacity of the battery is 420-amp-hr. With careful operation this is ample for the twelve to fourteen-hour schedule, which means a daily run ranging from 69 to 98 car-miles. The average schedule speed is 6.5 to 7 m.p.h. on Manhattan lines, but the City Island cars (four in winter and twelve in summer) make 9 m.p.h. on account of long free runs through park territory. The energy consumption varies, of course, according to traffic conditions as well as to the skill of the motormen. Thus, with a battery potential of 113 volts the average ampere-hours per car-mile of the five Manhattan divisions shape up as follows: 5.20 amp-hr. on the West Belt line, 5.22 amp-hr. on the 110th Street line, 5.72 amp-hr. on the Twenty-eighth-Twenty-ninth Street Crosstown line, 5.82 amp-hr. on the Avenue B line and 5.87 amp-hr. on the East Belt line.

A copy of the ampere-hour records of all motormen and the corresponding car numbers is sent by the transportation department to the storage-battery foreman. The former, therefore, has a check on the motormen while the mechanical department has one on the cars. The ampere-hour meters have given an excellent account of themselves. Outside of occasional careless handling, due in no way to the type of meter, they require no other maintenance than an occasional cleansing of the mercury. Such a cleansing may be needed at intervals of six months to two and one-half years.

Compact Wet Process Insulator

A demand for small compact wet process insulators for sustaining heavy loads has led the Pittsburgh High Voltage Insulator Company, Derry, Pa., to place on the market the type of insulator shown in the accompanying illustration. The bearing surface of the insulator is 9 in. in diameter, and it stands 10 in. high. It is provided with petticoats or corrugations to increase the creepage distance under rainy or stormy conditions.

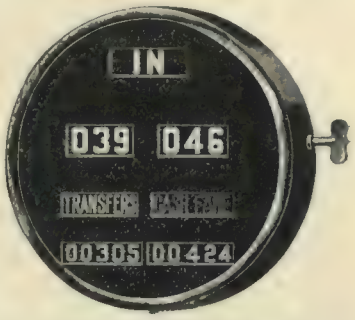


CORRUGATED WET PROCESS INSULATOR

It is supplied with a metal cap and base for attachment to the bottom of towers, the object being to provide an insulated base for support and insulation of heavy towers. The insulator shown in the illustration is designed to maintain a 500,000 lb. compression load, and to have an ultimate strength of 1,150,000 lbs.

Double Fare Register Adapted for City and Zone Operation

The New Haven Trolley Supply Company, New Haven, Conn., is just placing on the market a new Sterling double fare register which is particularly adapted for interurban service, where the zone system of fare collection is used, and also for city service. This machine obviates the need for two styles of register equipment where it is desirable to shift cars from city to interurban or from interurban to city service. In other words, this register gives one standard equipment for both interurban and city service. The machine visibly indicates the number of the zone, or trip, in which the fare is being collected. As the indicator is very prominent it greatly facilitates inspection, and serves as a reminder to the conductor not to "neglect" to reset his register at the end of each zone, or trip. The company has recently furnished a full equipment of these registers, and center-ringing device, to the Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va.

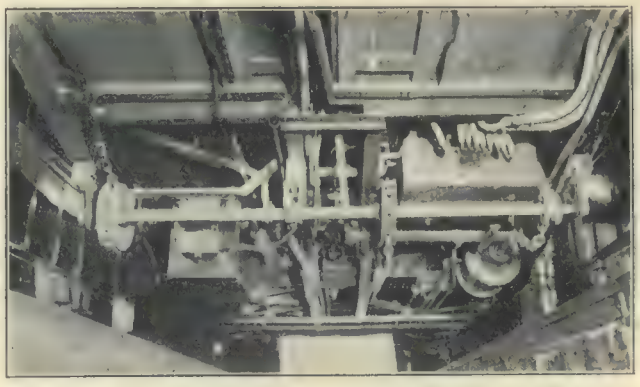


DOUBLE REGISTER ADAPTED FOR CITY AND ZONE OPERATION

Light-Weight Electrical Equipment of Wilkes-Barre Center-Entrance Cars

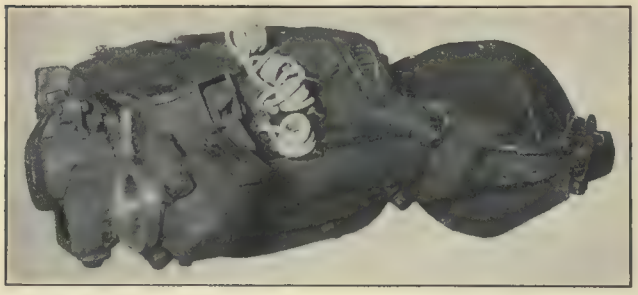
Supplementing the description of the Wilkes-Barre Railway's six center-entrance cars described in the ELECTRIC RAILWAY JOURNAL for March 13, the Westinghouse Electric & Manufacturing Company furnishes the following data on their light, compact electrical equipment.

Each truck carries two Westinghouse No. 532-B motors. The No. 532-B is a self-ventilated motor of the box-frame type, and has a rating of 36 kw (48 hp) at 600 volts. This motor equipment is the most powerful to which the light-weight HL equipment has ever been applied. The floor of the cars at the center entrance is approximately 13 in. above the ground, whereas at the trucks clearance must be provided for the 30-in. wheels. Consequently there is but little space for the control and brake equipment beneath the car.



UNDERFLOOR LAYOUT OF EQUIPMENT, WILKES-BARRE CENTER-ENTRANCE CAR

The switch group of this control weighs only 350 lb. Otherwise, a complete light-weight HL equipment is made up of the same number of parts as the regular



SELF-VENTILATED MOTOR OF 36 KW CAPACITY, INCLUDING GEAR CASE

type HL. The switch group has an over-all height of only 17 in., thus being easily mounted under low-floor cars. The master controller used with the light-weight apparatus has an interesting feature in that it is provided with a slip ring which causes all the important circuit-breaking switches to open simultaneously whenever the master controller is "backed off" one notch from any position. This causes a division of the final break between several switches, eliminates all other current breaks when "backing off" and thereby greatly decreases the wear on switch contacts, arcing horns and arcing boxes.

The weight of the electrical equipment is 11,580 lb. Other weights are as follows: Car-body only, 22,000 lb.; each Brill 27 MCB-2X truck, 7200 lb.; Westinghouse semi-automatic air brakes and other equipment, 2000 lb.; total car complete, 49,980 lb.

Tread-Pickup Rerailer for Cars Which Serves Also as Derailer for Vehicles

The accompanying illustrations show a radically new and improved rerailer made by the Sargent Company, Chicago, Ill. This rerailer is the result of several years of experimenting to obtain a final contour which will most readily serve to rerail wheels in track on paved streets. The principle used is asserted to be new in rerailing devices in that the wheel is picked up on its tread rather than on the flange. This method of rerailing requires much less elevation for the function of sliding the wheels to the rails. With other devices it is the practice to roll the wheels on their flanges over the rerailer and irrespective of the form of the flange. In such cases the car must be lifted from ⅝ in. to 1 in. higher before it is well mounted on the rerailing device.

With the Sargent rerailer, projections are provided as a part of the main casting. These projections serve to put the full weight directly onto the tread and thus give good traction before the flange climbs onto the body of the rerailer and reaches the point where it will automatically slide onto the rail.

The accompanying halftones are from photographs made on the property of the Evanston (Ill.) Street Railway where these rerailers have been put to diversified use. They have been employed not only for rerailing cars, but also for derailing wagons and electric automobiles, which, under certain conditions of the pavement, get wedged between the gage lines of the running rails. One illustration shows the device in use for derailing a wagon. Another shows this device and the old style turtle-back rerailer. This view illustrates the difference in angle and vertical lift of the two devices and the consequent ease with which the new device operates.



RERAILER EMPLOYED AS A DERAILER TO GET A WEDGED WAGON WHEEL OFF THE RAILS



NEW RERAILER AT LEFT AND OLD-STYLE RERAILER AT RIGHT

Motor Efficiency

R. E. Hellmund in the *Electric Journal* states that while a high efficiency in the railway motor is desirable, as in any motor, there are a number of reasons which make it inadvisable to give the question of efficiency too much weight. High efficiency means large and heavy motors and, in many cases, it might occur that the addition of a certain motor weight to make a small gain in efficiency would be bad engineering because the gain in motor efficiency might be more than outweighed by the power consumption necessary for hauling that a extra weight. It should further be considered that a reduction of efficiency caused by increased ohmic resistance in the motor does not mean very much, especially in city service, because there the motor is operated a large part of the time, and especially during the periods of large currents, with external resistance in circuit anyhow, and because the resistance losses in the motor itself are relatively small. It is somewhat different with the core losses of the motor which constitute a source of power consumption which can always be reduced by keeping the core losses of the motor low, as far as this can be done without materially increasing the weight and size of the motor.

The bureau of standards at Washington, D. C., is distributing upon request its publication entitled "The Testing of Materials." The publication is an eighty-nine-page pamphlet dealing with such subjects as metals and alloys, cements, clay products, lime, stone, paint materials, bituminous materials, inks, paper, textiles, rubber, leather, lubricating oils and greases, chemicals, and materials intended for technical use, such as electrical materials, optical materials, thermal materials, etc. The introduction gives briefly the theory upon which the testing of materials is based and outlines the purpose and ultimate aim of the bureau's work in this direction.

News of Electric Railways

CHARGES AGAINST COMMISSIONERS

Four Members of New York Commission, First District, Served with Charges—Reply Required by March 23

Four members of the Public Service Commission for the First District of New York—Edward E. McCall, chairman; J. Sergeant Cram, George V. S. Williams and Robert Colgate Wood—received on March 13 from Governor Whitman letters containing charges against them. The fifth commissioner, Milo R. Maltbie, whose term expired on Feb. 1, and who is holding over temporarily, got no communication from Albany. March 23 has been fixed as the date on or before which the commissioners may answer publicly in person or by counsel. The charges against Chairman McCall follow:

1.—He has been inefficient and neglectful of his duty in failing to supervise the handling by the subordinates of the commission of complaints of citizens regarding service on street railroads, and in failing to give support to the efforts of said subordinates necessary to enable them to accomplish satisfactory results.

2.—He has been inefficient and neglectful of his duty in failing to inform himself of the outstanding orders of the commission regarding service on street railroads.

3.—He has been inefficient and neglectful of his duty in permitting street railroad companies to violate the orders of the commission and in failing to resort to the remedies provided by law to compel compliance with said orders.

4.—He has been inefficient and neglectful of his duty in failing to compel street railroad companies to furnish such service to the public as could reasonably have been required under existing conditions.

5.—He was inefficient and neglectful of his duty in failing to require the Bradley Construction Company to cease work on the Lexington Avenue route of the subway, after having been advised by the chief engineer of the commission that this work would be useless in the event that the dual subway system was adopted.

6.—He has been inefficient and neglectful of his duty in permitting unreasonable and unnecessary delays in the final deterimnation of matters taken up by the commission in formal hearings.

7.—He was guilty of misconduct in office in devoting a considerable portion of his time to the private practice of law at a time when he should have been devoting all of his time to the business of the commission and acquainting himself with the duties of his office, the existing orders of the commission and the details of administration of the commission's affairs, and in absenting himself from the stated meetings of the commission, at which important business was transacted, in order to attend court on the same days in the interest of private clients.

8.—He was guilty of misconduct in office in using an automobile belonging to the commission for his own private purpose, and also in using the office of the chairman of the commission as a place for the taking of testimony in connection with his private practice.

The first five charges against Commissioner Cram were the same as the first, third, fourth, fifth, and sixth against Chairman McCall. Two others were individual to him. They were:

6—He was guilty of misconduct in office in using an automobile belonging to the commission for his own private purposes, as more fully specified on pages 16 and 17 of said report.

7.—He has been inefficient and neglectful of his duty in failing to devote the time and attention necessary to the faithful and efficient performance of the duties of his office, as is more fully specified on pages 15 and 18 of said report.

Only six charges were made against Commissioner Williams. Of these four were the same as the first, third, fifth and sixth counts against Chairman McCall, and he is also required to answer these special accusations:

3.—He has been inefficient and neglectful of his duty in failing to compel street railroad companies, and especially the street railroad companies in the Borough of Brooklyn, over which he had direct personal supervision, to furnish such service to the public as could reasonably have been required under existing conditions.

6.—He was guilty of misconduct in office, adjourning the hearing in Case No. 1436, involving the question of increasing the car equipment on the elevated lines in Brooklyn for a period of more than a year without disclosing to the public the fact that the commission had determined not to order additional elevated cars until final decision had been made as to the adoption of the dual subway contracts, and in neglecting to make an order in said proceedings requiring additional car equipment.

Against Commissioner Wood the same charges are brought as in the first, second, third, fourth and sixth specifications against Chairman McCall. The charges referring to him exclusively are:

6.—He has been inefficient and neglectful of his duty in failing to familiarize himself with the provisions of the Public Service Commission law.

7.—He was inefficient and neglectful of his duty and was guilty of misconduct in office in unnecessarily delaying the letting of a contract for the construction of a signal system in the Center Street loop.

DETROIT TRAFFIC SURVEY

Report by Barclay Parsons & Klapp Recommends Rerouting Loops and Two-Car Units—Cost of Downtown Subway $2,500,000

Barclay Parsons & Klapp, New York, have presented their report on their traffic survey of Detroit to the Municipal Street Railway Commission. The report covers 298 printed pages and includes twenty-one maps and plans. Provision is made in the recommendations for both temporary immediate relief and for permanent readjustment of the car lines and routes. Referring to the rush-hour problem the report says:

"The Detroit street railway rush-hour problem is essentially a case of unusual traffic concentration, due to a system of converging car lines loading and unloading the bulk of their passengers in a very limited central delivery district. The permanent nature of this district and the distribution of the new population during the recent rapid growth of Detroit clearly indicates that the convenience of the traveling public will best be served by continuation of their present main lines of travel."

Speaking of the density of traffic in Detroit, the report says:

"In the period from 1904 to 1914 the total revenue passengers grew from 78,349,220 to a total of 219,606,056, an increase of 180 per cent. This latter figure gives a density of traffic per mile of main single track of 1,062,000 revenue passengers, which is about 40 per cent heavier than in Cleveland in 1913, and 44 per cent heavier than the density on the surface and elevated lines in Chicago in 1914."

Briefly stated, the report recommends as follows:

Entire rerouting of various lines entering the heart of the city by a system of loops to eliminate, as far as possible, the present crossing interference. This rerouting provides for the looping back of cars not required for the carrying of legitimate through traffic across the center of the city. Two-car units are suggested on Woodward Avenue, with larger car units on some of the lines now using old type cars, the extension of crosstown lines, a system of "skip stops" on the heavy traffic lines, street collectors at the front doors in the downtown district in the rush hour, special non-stop cars through the crowds of factory workers on some of the main lines to take care of

ordinary traffic, and suitable ordinances to encourage the use by automobiles of streets on which car lines do not operate.

The report sets forth that $400,000 spent for track changes, repaving, curbing and other items involved in a complete rerouting plan, in addition to the operation of two-car units and a system of "skip stops," will increase the carrying capacity of the lines from 30 per cent to 50 per cent.

The immediate construction of a long subway on Woodward Avenue, the heaviest traffic artery, is not recommended. The estimated cost of a long subway, 6 miles, is placed at $16,300,000, and even if a population of 1,000,000 is reached by 1920 the advisability of such a subway is questioned. The alternative of a short subway, that is, putting the street cars underground downtown, is discussed also. A tube of this kind, so built as to be available for a terminus of a complete subway system, would cost $2,500,000.

PHILADELPHIA ELECTRIFICATION TRIALS

It was announced that a few minutes after midnight on March 18 the Philadelphia Electric Company would cut over service to the cables of the Pennsylvania Railroad leading to the Bryn Mawr substation and that trial runs would follow on the electrified line of the Pennsylvania Railroad between Philadelphia and Bryn Mawr, connection with Paoli being made later. It is expected that regular service between Philadelphia and Paoli will begin on May 30. There are now forty-six trains from Philadelphia to Paoli, and forty-seven inbound trains, while under the tentative schedule there will be fifty-one eastbound and fifty-four westbound trains. All cars for the electric service are equipped and ready. There are ninety-three of them, all steel cars, each with a seating capacity of fifty-four passengers. Eight of these cars were in the West Philadelphia yard on March 15 and will be used in making trial runs.

CINCINNATI FRANCHISE DEFEATED

At the referendum election on March 9 the franchise granted the Cincinnati, Newport & Covington Street Railway for a terminal in Cincinnati, Ohio, was defeated by a vote of 32,494 to 23,591, or a majority of 8903. Secretary Polk Laffoon of the company declined to make a statement in regard to the results. Some of the conditions of the franchise and the agreements upon which it was based have been complied with by the company. It is likely that the portions of the ordinance known to be objectionable will be revised to meet the views of the opponents of the franchise.

Speaking of the defeat of the franchise, W. W. Freeman, president of the company, said that probably no definite plans will be considered for a few days. The company's franchise on the Covington line has expired and it has no franchise on the division that reaches Cincinnati. Mr. Freeman said, however, that the company would be glad to keep its cars in operation, and Mayor Speigel announced that an agreement has been reached with Director of Public Service Fosdick by which the city will receive the same franchise tax that was paid before the expiration of the old franchise.

The transportation committee of the Federated Improvement Association, which opposed the franchise of the Cincinnati, Newport & Covington Street Railway in the recent referendum election in Cincinnati, has suggested that a committee made up of three members each from the Power League, the Business Men's Club, the City Club, the Chamber of Commerce and the Federated Improvement Association, be appointed to meet the officials of the company and members of the City Council in an endeavor to arrive at an agreement on a form of franchise that will be mutually satisfactory.

A conference was held on March 11 by those interested in the proposed construction of the Bond Hill line by the Cincinnati Traction Company, at which a number of residents of that suburb, Service Director Fosdick, City Engineer Krug, City Solicitor Schoenle and Walter Draper, vice-president of the Cincinnati Traction Company, were present. Residents of Avondale were recently refused an injunction against the construction of the line on the ground that the street on which the tracks are to be laid had not yet been built. With the legal question settled an attempt will be made to reach an agreement in regard to the construction of the line.

LEGISLATION IN PENNSYLVANIA

The following bills affecting public utilities are pending in the Pennsylvania House: to repeal the Public Service Company law; to amend the Public Service law with municipal exemptions; to require lights on certain vehicles; to provide for the incorporation of omnibus lines; to provide a workmen's compensation act; to tax the real estate of public service companies; to require "all street cars to be equipped with air brake attachment and automatic air couplers"; to regulate the hours of employment of signal men, gatemen, etc., on any railroad by steam or electricity and provide compensation for extra labor; to require toilets on cars and terminal stations for street railways operating 15 miles; to empower cities of the second class to levy and collect taxes on railroad switches, turnouts, etc., on public streets; to empower cities of the second class to levy and collect taxes on poles, wires, cables, etc., on public streets; to regulate advertisements and solicitations for employees during strikes and other labor troubles; to revise, consolidate and amend the law relating to certain corporations; to establish a department of State police, etc., and providing for increases in pay; to permit members of the General Assembly and State officials the right of free transportation over carriers; to relieve from the payment of mercantile license tax corporations which pay a tax on capital stock; to regulate motor vehicles by changing the age condition so that no one under fifteen years shall be permitted to operate a car unless accompanied by a regularly licensed operator, no person between fifteen and eighteen to receive a license unless his competency has been attested by two licensed operators; to regulate the use of public highways by vehicles; to require suburban electric railways to provide waiting rooms; to take away from the Public Service Commission jurisdiction over counties, cities, etc., in certain matters and vesting the same in the court; amending the act to regulate the transaction of business by foreign corporations; to define public service companies and to establish a public service bureau in the Department of Internal Affairs, etc.; to provide for the equipment of all street cars with efficient air brakes, etc.; to limit the hours of labor of motormen, conductors and drivers employed by horse, cable and electric railways.

Among the bills introduced in the Senate are the following: to repeal the public service company law; to require the license and registration of private detective and detective agencies; to empower municipalities to construct and maintain street railway tracks and equipment for the operation of street cars and to lease said equipment, etc.; to authorize and empower municipalities to construct and give them the right of condemnation if necessary and to maintain and operate underground street railways and also street passenger or elevated railways connecting therewith or exchanging passengers with said underground street railways and to lease the underground street railway and any surface or elevated street railway connecting therewith to corporations, etc.; granting the right of eminent domain to boroughs and towns; directing the Public Service Commission to investigate the issuing of bonds of corporations, etc.; regulating the voting and meetings of stockholders of corporations; regulating and standardizing insurance policies.

Among the bills that have passed the Senate of interest to public utilities is one to empower municipalities to construct and operate overhead, surface or subway street railways.

Among the bills that have passed the House is the one to amend the act regulating auto vehicles, etc.

The bill in regard to the regulation of the "jitney" bus in Pennsylvania is referred to on page 603.

John R. Rose, Oklahoma City, Okla., and associates of Miami plan to build an interurban line to extend from Miami to Tulsa and north from Miami to connect with the interurban line in Missouri.

OHIO COMMISSION SUSTAINED

In a decision handed down on March 16 the Ohio Supreme Court sustained the Public Utilities Commission in an order issued to the Hocking Valley Railroad to resume electric service between Hamden and Jackson. It is probable that the case will be appealed to the United States Supreme Court. The most important point involved is whether a railroad can abandon an unprofitable portion of its line when the property as a whole has shown a profit.

Some time ago citizens filed a petition with the Public Utilities Commission, alleging that the Hocking Valley Railroad had operated an interurban service between Hamden and Jackson since 1896, and furnished current for lighting to towns along the route and to private consumers. A year ago the company proposed to discontinue this service and an order was asked to prevent abandonment of operation. The company contended that the service did not pay and offered to substitute steam trains. The commission ordered the company not to discontinue the interurban service, but made no ruling on the question of furnishing current.

MUNICIPAL OPERATION HAMPERED

Conflict between the requirements of federal and provincial statutes is responsible for a curious railway case in Brantford, Ont., dealt with in an order of the Railway Board on March 8. The city of Brantford owns a street railway acquired with municipal funds and under provincial authority; but it has no power to operate it because the original charter was a federal one. The City Council applied to the Railway Commission for relief, and Chairman Drayton, in his judgment, suggests that leave for operations be secured temporarily from the Minister of Railways until proper authority by parliamentary enactment is forthcoming. The Port Dover, Brantford, Berlin & Goderich Railway, a federally incorporated road, later changed its name to the Grand Valley Railway and acquired the Brantford Street Railway. Subsequently it became insolvent, and the city secured from the Legislature the right to purchase it. This was done, but the road is now on its hands without power of operation. Chairman Drayton says the Legislature has no more right to authorize operation of a federally incorporated road than it has to authorize its construction.

NEW YORK COMMISSION INQUIRY

The hearing on March 12 before the legislative committee at Albany into the work of the Public Service Commission of the Second District of New York was confined to the activities of Commissioner Irvine and Chairman Van Santvoord. Mr. Irvine said that there was no conflict between the two State commissions. He was opposed to any change in the territory allotted to the commissions. The expense accounts of Mr. Van Santvoord were inquired into. The commissioner had attached numerous memorandums to most of his items and the reading of them caused much laughter. He listed a trip from Albany to New York and return as "300 miles of danger at 2 cents a mile." He also listed $2 as the "amount paid to satisfy the modest but insistent demands of the intercostal subdiaphragmatic vacuities." On March 14 Col. William Hayward, counsel of the committee, injured his ankle severely in New York. This has delayed the progress of the inquiry, but it was expected that the sessions would be resumed late in the week.

MELBOURNE ELECTRIFICATION PROPOSAL

R. F. Millane, Collins House, Melbourne, Australia, has submitted an offer to the Melbourne Tramway Trust offering to carry out the conversion from cable to electricity of one of the main routes to and through the city, and a committee has been appointed to consider his offer and an early decision is expected. The trust may accept the offer of Mr. Millane or decide to carry out the work itself. The cable tramways in Melbourne were installed about twenty-five years ago and are similar to the lines which were installed in New York and in Washington. The plan is to equip each car with underground contact and trolley pole like those on the cars in Virginia and Maryland that run into Washington. Mr. Millane desires to hear from contractors for material and equipment such as were used in the conversion of the cable lines in this country to the underground system and to have such contractors quote prices for material and equipment. At a recent meeting of the Melbourne Tramway Trust it was agreed that the consideration of Mr. Millane's offer be postponed until the meeting of the board in February and in the meantime to obtain counsel's opinion as to the authority of the trust in connection with the proposal contained in the motion.

CLEVELAND PROPERTY LEASE

The Cleveland (Ohio) Railway has leased its property at St. Clair Avenue and East 103rd Street to Harry S. French for ninety-nine years, the rental being based on a valuation of $40,000. This property has been used for twenty years for a carhouse and repair shop, but a few months ago a new unit was completed near it and the company had no further use for the property. It will be improved with an apartment house and business buildings.

The company has asked Council for authority to purchase fifty new center-entrance cars at an aggregate price not exceeding $300,000. Councilman Stolte stated that he would insist that the company sell fifty of the old cars for use in other places before this authority was granted.

Agreement on the proposed new franchise in Lakewood has been delayed by a difference between the company and Peter Witt, street railway commissioner, as to its terms. It is probable that a general conference of those interested in the matter will be called soon.

CALGARY MUNICIPAL RAILWAY

In discussing the condition of the Calgary (Alta.) Municipal Railway Commissioner Greaves said that to operate the line as if it were owned by a private company would involve discontinuing service over some 10 or 20 miles of track. The citizens would not submit to this. P. S. Fitter, publicity commissioner, stated through a communication to the press on the finances of the line that although the loss on operation for the eleven months ended Nov. 30, 1914, was $44,284, during the four years' operation of the line a surplus of $300,000 had been built up over and above all fixed charges. The loss in operation was confined practically to the Bowness Park line and to the line to the Canadian Pacific Railway's Ogden shops. The present loss on this latter line is $50 a day.

The Street Railway Men's Association has accepted the new wage schedule, which provides for a reduced rate of pay consequent upon war conditions. The new schedule, effective at once, provides as follows: while operating on the spare list, first year, 28 cents an hour; second year, 30 cents; after two years, 32 cents. Regular runs, first six months, 32 cents; second six months, 33 cents; third six months, 34 cents; fourth six months and thereafter, 35 cents. It is estimated that this schedule will effect a saving of about $10,000 during the year.

LEGISLATION IN OHIO

Governor Frank B. Willis of Ohio has disappoved the Smith bill, which required inclosed vestibules on all cars for motormen. His reason was that the measure stated no time at which it was to go into effect. It is stated that a substitute bill will be introduced to become effective on Nov. 15, 1915.

The bill introduced in the Legislature by Senator L. E. Myers, providing for the construction and operation of union stations by steam and electric railways jointly will permit leasing of all grounds, tracks, etc. The present law provides only for the purchase of grounds for such structures. In addition, the bill would make it possible to construct, maintain and operate terminal railroads and connecting tracks, warehouses, office buildings, hotels and other buildings for the use of the public or to own and lease them. The requirement that the maximum charge per passenger handled within the city limits shall not exceed 1 cent is also suspended by the bill. The bill is before the judiciary committee of the Senate.

Senator Stone has introduced a bill in the Legislature which, if made a law, will authorize the Ohio Public Utilities Commission to regulate all municipally owned service plants, with the exception of the issue of bonds. This authority would extend to fixing rates and establishing a uniform system of accounting.

The Philadelphia Election.—The special election in Philadelphia at which the city will vote on making $6,000,000 available for transit improvements will be held on April 29.

Chicago Unification Upheld.—Quo warranto proceedings attacking the validity of the unification ordinances under which the Chicago (Ill.) Surface Lines have been operating for more than a year, were ordered vacated on March 17 by Judge Brentano in the Superior Court.

Valuation Conference Postponed.—The conference of railroad men and State utility commissioners with the Division of Valuation, Interstate Commerce Commission, scheduled for the week beginning March 22, has been postponed. At the present time it is the expectation that the conference will occur in the week beginning April 19.

Labor Rider Defeated.—The appropriations committee of the House refused to insert in the general deficiency bill the item of $200,000 for the relief of those against whom judgment was found in the Danbury hatters case. Ex-Judge Parker and Mr. Gompers contended that Congress did not intend to cover labor unions in the Sherman Act.

Extension of Powers of New Jersey Commission.—The Senate of New Jersey has passed Senator Read's bill placing municipally-owned utilities under control of the Board of Public Utility Commissioners. The bill in its original form did not affect Newark or Jersey City, but Mr. Read, in answer to opposition to the exceptions made, offered an amendment including first-class cities under the proposed law. The amendment was adopted.

Pan-American Financial Conference.—A cabled invitation from Secretary of State Bryan to all the countries of South and Central America to send three representatives to Washington as guests of the United States for the Pan-American Financial Conference on May 10 was transmitted to the foreign ambassadors and ministers on March 15. Mr. Bryan will send out later invitations to bankers and business men of this country to participate in the conference.

Basic Conditions Sound.—Theodore N. Vail, president of the American Telephone & Telegraph Company, on March 15 set forth in a letter to the security holders of that company, supplementing his annual report, his views respecting the general business situation and the course which should be pursued to restore prosperity. While admitting frankly that "there is a condition of disturbance, of economic unsettlement, it cannot continue indefinitely." He insists that the country was never in better shape basically.

Ohio Efficiency Report.—Kenneth McKinley, efficiency engineer of the Ohio State Civil Service Commission, has reported to the Howard committee in regard to the economies that can be worked with the Public Utilities Commission of Ohio. Mr. McKinley has recommended that nine positions be abolished and that the salaries of ten employees be reduced, for an annual saving of $25,000. On March 13 it was announced that the recommendations would be adopted.

Settlement of Claims at Toledo.—An agreement was reached on March 12 between the city of Toledo, Ohio, and the Toledo Railways & Light Company in the matter of the company's paying its share of the cost of pavement on Cherry Street. The amount due the city was $48,732, but for the first half of 1914 the city owed the company for street lighting $60,704. In paying this bill the paving charge was deducted and a warrant issued for the remainder, $11,971.

Abandoned Road a Testing Ground.—The City Council of Peterborough, Ont., has asked the Ontario Legislature to authorize the making of an arrangement with the Grand Trunk Railway for a lease to the Canadian General Electric Company of a portion of the right-of-way of the Peterborough & Chemong branch line as a testing track for electric locomotives. This branch line extends from Peterborough to Bridgenorth, and has not been operated for a number of years.

Engineer Appointed to Draw Toronto Plans.—E. L. Cousins has been chosen engineer to have charge of the work of drawing up the plans for Toronto's rapid transit system. Recently three engineers, R. C. Harris for the city, E. L. Cousins for the Harbor Board, and Mr. Gaby, of the Hydro-Electric Power Commission of Ontario, were appointed to submit a plan. At the request of Messrs. Harris and Gaby, Mr. Cousins has been asked to do the work. The Harbor Board has granted him leave of absence until the work is completed.

Ontario Hydro-Radials.—The Ontario Hydro-Radial Union deputation waited upon Premier Borden at Ottawa on March 10 and asked the granting of a subsidy for building hydro-electric radial railways through Ontario. The Premier replied that so far as any legislation at the present session was concerned conditions would not permit the government to bring it in. As far as a declaration of future policy was concerned, the Premier announced that he would submit to his colleagues what had been urged, but would not make any announcement as to policy.

Question of Authority.—In an argument which has just been concluded before Mr. McIntyre, chairman of the Ontario Railway & Municipal Board, the Hamilton, Grimsby & Beamsville Electric Railway contends that the board has no right to make orders concerning the road. The question was raised as the result of the board ordering the company to install certain sanitary appliances on the cars. The company says that in 1895 the Dominion Railway Board issued an order allowing it to cross a steam railway, and that this established the company under the jurisdiction of the Dominion Railway Board.

Ohio Commission Upheld.—The Ohio Supreme Court has approved the decision of the Public Utilities Commission in a case in which the city of Cincinnati appealed from a commission order. Some time ago the Council of Cincinnati unanimously passed an ordinance requiring the Cincinnati Traction Company and the Cincinati Street Railway to extend the Warsaw Avenue line along Glenway Avenue from Wilder Avenue to Seton Avenue. The companies appealed to the commission, which decided that the extension demanded was not practical because of the steepness of the grades and relieved the companies from complying with the terms of the ordinance.

Subway Cable Accident.—Fire supposed to have been caused by a workman drilling through the old subway wall at Seventh Avenue and Broadway, New York, into electric cables and wires at the north end of Times Square station of the present subway blazed fiercely between 3:15 and 5:10 a.m. on March 15, filling the tunnel with smoke. For two hours not a subway train stirred between Fourteenth and Ninety-sixth Streets. Shuttle trains were operated south of the downtown station and north of Ninety-sixth Street. The blaze spread to the heavy planking that has taken the place of pavement for Seventh Avenue at this point during the construction of the new subway. The telephone insulation was burned through and practically put the Murray Hill exchange out of operation.

Reimbursing the Seattle Municipal Railway Fund.—Mayor Gill, of Seattle, Wash., has signed the bill placing $10,000 in the street railway fund to meet the deficit incurred in the operation of the municipal railway lines in that city, but City Comptroller Carroll is reported to have announced that when the warrants come to him for his signature on March 25 he will refuse to sign them. The comptroller regards the "loan" as a deficit appropriation and says that as there is little likelihood of the railway paying back the loan it will be necessary eventually to raise the money by general taxation to reimburse the general fund. The communication from Mayor Gill dealing with the question of the deficit of the municipal railway was published in part in the ELECTRIC RAILWAY JOURNAL of Feb. 27, page 431.

The Cincinnati Inventory.—It was stated at the office of the Ohio Public Utilities Commission on March 16 that the inventory of the property of the Cincinnati (Ohio) Traction Company had been in its hands for two weeks, but that the figures are only tentative and are so regarded. Before any step can be taken toward a final valuation, the inventory must be checked by engineers of the department and then the appraisals must be made. The resolution introduced in the Council giving City Solicitor Schoenle authority to bring proceedings against the Cincinnati Traction Company to compel it to permit him to examine its books for the purpose of making a physical valuation has been referred to the committee on street railways, with instructions to Mr. Schoenle to ascertain from the Public Utilities Commission when it expects to complete its similar investigation.

Appeal to Supreme Court Against Competition.—The Ohio Public Utilities Commission recently authorized the Mahoning County Electric Company to purchase the plant of the Youngstown Heating Company through the issuance of $600,000 of twenty-year 6 per cent bonds and $400,000 of stock and to erect an electric generating plant which would come into direct competition with the lighting and power business of the Youngstown-Sharon Railway & Light Company, Youngstown, Ohio, in the business district. The commission held, however, that it was compelled to give consent to any reasonable issue of securities except in the case of telephone companies, and that the law did not provide for regulated monopoly in public utility service. The railway company has now appealed to the Ohio Supreme Court for relief from destructive competition.

Rapid Transit Construction Resumed.—With the Alien Labor law amended, the Public Service Commission of the First District of New York decided on March 16 that it could resume its program of construction, which had been held up for nearly three months. It ordered that bids be invited for the section of the Brooklyn Rapid Transit Company's subway in Seventh Avenue from Fifty-first to Fifty-ninth Street, and that they be opened on April 9. This contract has already been put up three times for bids, but had to be withdrawn on account of the alien law controversy. The change in the law requires that the existing construction contracts be modified so that the clause in them conforming with the old alien clause be made to fit the amendment to the law. Counsel of the commission has been instructed to prepare modifications so that the clause which required contractors to employ only citizens be made to demand merely preference to citizens.

New Franchise in Lakewood, Ohio.—On March 13 an agreement on a new franchise for Lakewood, a large western suburb of Cleveland, Ohio, was reached at a conference of the officials of that place, officers of the Cleveland Railway and Peter Witt, street railway commissioner. The proposed ordinance provides that the Madison Avenue line shall be extended from West 117th Street to Rocky River and that the new portion shall be in operation within six months. In return the company is to receive a franchise that will expire with the Tayler franchise in the city in 1934, which means an extension of eight years. The fare between the city and Lakewood is to be straight 5 cents, instead of eleven tickets for 50 cents, as at present, and the fare within the city of Lakewood is to be 3 cents. The ordinance was introduced in the Lakewood Council on March 15 and referred to the street railway committee. The franchise must also be approved by the City Council of Cleveland.

Suburban Rapid Transit Suggestion.—Ralph Peters, president of the Long Island Railroad, has notified the Public Service Commission for the First District that his company will consider a proposition from the city for the operation of the dual system rapid transit trains over the elevated railroad to Corona, the present terminus of the city-owned line, to and through Flushing to Whitestone and to the city limits at Little Neck over the tracks of the Long Island Railroad. The company is willing to make an arrangement for the use of such tracks for a reasonable rental, to be paid by the city, whereby rapid transit may be extended to Whitestone and Little Neck without the city going to the expense of constructing additional tracks beyond Corona. Mr. Peters estimates that it would cost the city about $6,800,000 to build extensions to Whitestone and Little Neck and that it would cost only $500,000 to build the connection between the city line at Corona and the Long Island tracks near Whitestone Junction. He suggests that a contract be made for ten years, with the privilege of renewal for the same period of time. The commission has referred the matter to counsel and chief engineer for opinion and report.

PROGRAM OF ASSOCIATION MEETING

Gas, Electric & Street Railway Association of Oklahoma.

The fourth annual convention of the Gas, Electric & Street Railway Association of Oklahoma will be held in Oklahoma City on May 12, 13 and 14, with headquarters at the Lee-Huckins Hotel.

Financial and Corporate

BANKERS CALL FOR SUIT

Dick Brothers & Company, New York, who own and control 11,000 shares of the Long Island Railroad, on March 18 served a notice on Ralph Peters, president, and the directors to bring suit against the Pennsylvania Railroad for the restitution of alleged misappropriated funds and for the cancellation of certain contracts. This notice states that unless suit is begun by the railroad officials within ten days the banking house will bring suit in its own name against the Pennsylvania Railroad and the directors of the Long Island Railroad. Prior reference to circulars issued by the bankers asking for proxies were made in the ELECTRIC RAILWAY JOURNAL of Feb. 6 and Feb. 20.

Among the requests cited in the notice served upon Mr. Peters there was one asking for an injunction to restrain the payment to the Pennsylvania Railroad of moneys on account of advances alleged to have been made in carrying out construction projects on Long Island initiated by the interlocking directorates of the two companies. It was further requested that the Long Island Railroad be returned to its status as an independent company, that an accounting be made of all expenses authorized by the board of directors and of the cost of electrifying tracks in the commuting zone, and that the contract covering the carriage of Long Island passengers into the Pennsylvania Terminal be cancelled.

An official of the Long Island Railroad said that everything which the company had done had been authorized by the Public Service Commission, and that the company welcomed an investigation. It is doing better every year, and, according to the last report, showed a deficit only half as large as the year before.

WAR REVENUES OF BERLIN TRAMWAYS

The Great Berlin Street Railway is operating all of Berlin's surface car lines, which are 240 single-track miles in length and have 2078 motor cars and 1334 trailers. The following table shows the comparative monthly revenues for 1913 and 1914 (also January, 1915, revenues 3,157,886 marks), indicating a decrease of 3,669,215 marks, or $891,619, for the last year mostly because of the war.

REVENUES PER YEAR IN MARKS (24.3 CENTS).

Month	1913	1914
January	3,579,735	3,399,936
February	3,394,265	3,295,781
March	3,880,679	3,707,039
April	3,769,961	3,715,807
May	3,829,493	3,695,319
June	3,748,779	3,567,340
July	3,553,513	3,518,415
August	3,647,969	3,272,977
September	3,708,611	3,054,923
October	3,859,086	3,264,484
November	3,695,974	3,109,364
December	3,848,969	3,327,713
Total	44,483,065	40,803,855

ALLEGED VIOLATION OF UTILITIES ACT

J. B. Hogarth, formerly general superintendent of the Chicago (Ill.) Railways, has filed a complaint with the Illinois Public Utilities Commission, alleging that the officers of the Commonwealth Edison Company, Chicago, by their purchase of $20,000,000 of the common capital stock of the Chicago Elevated Railways collateral trust, violated the commission law. Mr. Hogarth also filed a second petition questioning the method of financing the Chicago Elevated Railways collateral trust and charging that the officers of the trust did not obtain the consent or authority of the commission to issue approximately $23,000,000 of securities and that they failed to pay the State a fee of $23,000 required under the commission act. In an interview with a representative of the ELECTRIC RAILWAY JOURNAL, one of the attorneys for the Commonwealth Edison Company admitted that his client did hold $20,000,000 of capital stock of the collateral trust. It was asserted, however, that this purchase was made without violating the law, since the trust was made up of an association of individuals who had purchased a controlling interest in the four elevated railway companies. The trust was not a public utility and therefore was not under the jurisdiction of the commission.

ANNUAL REPORT

Public Service Corporation

The statement of income, profit and loss of the Public Service Corporation of New Jersey, Newark, N. J., for the twelve months ended Dec. 31, 1914, follows:

Operating revenue of subsidiary companies		$35,924,453
Operating expenses and taxes	$19,892,708	
Amortization charges	1,303,609	
Total		$21,196,317
Operating income		$14,728,136
Non-operating income	351,161	
Public Service Corporation of New Jersey income from securities pledged and from miscellaneous sources	2,484,645	
Total income		$17,563,942
Income deductions of subsidiary companies (bond interest, rentals and miscellaneous interest charges)	12,097,109	
		$5,466,833
Public Service Corporation of New Jersey income deductions—		
Interest charges	$3,408,332	
Amortization of debt discount and expense	223,664	
Sinking fund for general mortgage 5 per cent bonds	209,500	
Total	$3,841,496	
Net income	$1,625,337	
Appropriation accounts of subsidiary companies:		
Additional amortization of capital	$2,750	
Amortization of new business expenditures prior to Jan. 1, 1911	40,330	
Adjustment of surplus account (credit)	103	
	$42,977	
	$1,582,360	
Appropriation accounts of Public Service Corporation of New Jersey—		
Adjustments of surplus account (credit)	728	
Net increase in surplus	$1,583,088	

The annual report states that the company under adverse conditions had a relatively successful year. The year's depression in business was felt by all the underlying companies. The normal annual gross increase in the railway company's business averages about 5 per cent, but during 1914 the operating revenue increased only 1.11 per cent. The normal annual gross increase in the electric company's receipts averages from 11 to 12 per cent, but last year the operating revenue increased 9.34 per cent. The normal annual gross increase in the gas company's business averages 7 per cent, but the operating revenue last year increased 3.61 per cent (partly owing to a difference in the rate for gas). The operating revenue of all the subsidiary companies increased $1,331,979, or 3.85 per cent, as compared to an average normal increase of about 7 per cent.

No comparative figures are presented for maintenance expenses during the year, but it is stated that the amount, exclusive of ordinary maintenance, set aside for amortization was $1,306,358. With the sinking fund charge added, the amount set aside during the year for amortization of properties and redemption of securities was $1,515,858. The taxes paid during the year amounted to $2,202,555, an increase over the previous year of $139,573. In five years the taxes paid by the corporation have increased approximately $1,000,000, but it is urged that the limit of the ability of corporations and individuals to meet these increases has about been reached, and that no further burdens of this character should be put upon property under present conditions.

The fire insurance carried as of Dec. 31, 1914, amounted to $29,009,824. This is an increase over the corresponding period of the previous year of $800,073. The premiums for 1914 amounted to $102,808, a decrease, as compared with the previous year, of $5,426, and a decrease in the rate per $100 of insurance from 44 cents for 1912 and 38.3 cents for 1913 to 35.4 cents for 1914. The total expenditures of the welfare department during 1914 were $79,794, an increase of $14,316. The cost of accidents under the workman's compensation act was $63,041, divided $44,200 for required payments, $9,101 for voluntary excess payments and $9,732 for expenses—a total increase of $6,622 for 1914.

The net expenditures charged to fixed capital accounts by subsidiary companies during 1914 were $2,644,099 for electric companies, $857,075 for gas companies and $1,389,961 for railway companies, a total of $4,891,136. Among specific improvements may be noted the building and opening of the Paterson & State Line Traction Company from the Paterson city line to Ridgewood, and the building and opening of the Sewaren Spur, extending from the Public Service Railroad tracks at Port Reading Junction to Sewaren, and making possible a new through line from Newark to Perth Amboy. Altogether, during the year, the railway company built 10.787 miles of track extensions. With land purchases in Camden and Paterson, it may be said that throughout the State the railway has acquired for carhouse, shop and terminal purposes practically all the real estate it needs.

The total passengers carried by the railway increased 0.71 of 1 per cent. The amount spent for accidents and the expenses in connection with the same was 4.27 per cent of the passenger receipts, as compared to 4.15 per cent for 1913. This company received honorable mention in the "safety first" contest for the Brady Medal. The following table shows the most important traffic statistics for 1913 and 1914:

	1914	1913
Revenue passengers	310,308,660	308,985,240
Transfers and passes	96,969,254	95,425,865
Total passengers	407,277,914	404,411,105
Percentage of passengers using transfers	21.2	21.1
Average fare per passenger, cents	3.83	3.82
Car mileage	50,792,889	49,853,408
Car hours	5,665,119	5,696,066
Passengers per day	1,115,830	1,107,976
Passenger receipts per car mile, cents	30.72	30.97
Passenger receipts per car hour, cents	2.75	2.71

Alabama Traction, Light & Power Company, Ltd., New York, N. Y.—It is reported that for the sake of more efficient and economical administration, several companies have been merged with the Alabama Power Company, Birmingham, Ala., the chief operating subsidiary of the Alabama Traction, Light & Power Company, Ltd. Besides the Decatur Light, Power & Fuel Company, the Leeds Light & Power Company and the Pell City Light & Power Company, the merged companies include two electric railways, the Anniston Electric & Gas Company, Anniston, Ala., and the Huntsville Railway, Light & Power Company, Huntsville, Ala. It is believed that this merger will enable the participating companies to obtain a larger amount of credit and make needed developments.

American Public Utilities Company, Grand Rapids, Mich.—Bioren & Company, Philadelphia, are offering at par and interest an issue of $1,500,000 of three-year 6 per cent secured gold notes of the American Public Utilities Company, dated March 1, 1915, and due on March 1, 1918. These notes are redeemable at any interest period for 101 and interest. They are secured by deposited collateral valued at more than $6,000,000.

Atlantic Gas & Electric Company, New York, N. Y.—Judge Hand, of the Federal District Court, has filed a decree ordering the foreclosure sale of the Atlantic Gas & Electric Company within ten days in the event of a final default on bond payments. Edward H. Childs has been appointed special master for the sale. The reorganization plan, under which the controlled properties of this company are to be taken over by the General Gas & Electric Company, was described in the ELECTRIC RAILWAY JOURNAL of Jan. 23.

Central California Traction Company, San Francisco, Cal.—The California Railroad Commission recently held a hearing on an application to lease the Central California Traction Company to the Stockton Electric Railroad for a rental of $12,500 a year for the first three years and $15,000 a year for the following thirty-five years. H. Fleishhacker, vice-president of the former company, stated that the road was losing about $14,700 a year because it was not possible to keep it in the highest condition of efficiency and to make improvements.

Cleburne (Tex.) Street Railway.—By order of a higher court the receivership of the Cleburne Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 23, has been vacated. John W. Floore, Sr., who holds the first mortgage of the company, states that the property will be sold immediately at public auction, and that if it is not purchased by others he will operate it. The line has not been in operation for several months.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Cleveland, Southwestern & Columbus Railway has applied to the Ohio Public Utilities Commission for authority to issue $319,875 of first consolidated 5 per cent bonds at 85, and, pending their sale, to hypothecate them at 65. The proceeds are to be used to reimburse the company for expenditures made in 1913 and 1914 and to retire $200,000 of underlying Cleveland & Elyria Railroad first mortgage 5 per cent bonds maturing on May 1.

Duluth-Superior Traction Company, Duluth, Minn.—The directors of the Duluth-Superior Traction Company have omitted the usual April 1 dividend of 1 per cent on the $3,500,000 of common stock of the company. This rate of dividend was paid quarterly from July, 1913, to January, 1915, inclusive. It has been decided, however, that a dividend of 1 per cent will be paid on July 1 to holders of record on June 15.

Electric Bond & Share Company, New York, N. Y.—The Electric Bond & Share Company is offering $1,000,000 of new preferred stock to its preferred stockholders at par in the ratio of one new share for each five shares of old stock owned. The common stockholders of the company are being offered $1,000,000 of new common stock at par in the same ratio. Stockholders of record of March 3 have a right to subscribe. The increase of the capital stock of this company by the addition of $3,000,000 of preferred stock and $3,000,000 of common stock was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20. According to a comparative income statement just issued by the company, the figures for the last two fiscal years ended Dec. 31 are as follows: gross income, 1914, $1,558,521; 1913, $1,554,404; net income, 1914, $1,137,042; 1913, $1,129,396; preferred dividends, 1914, $298,392; 1913, $277,900; common dividends, 1914, $400,000; 1913, $363,000 (additional special dividend, $1,500,000); surplus income, 1914, $438,650; 1913, $488,495. The total surplus and undivided profits of the company at the close of business on Dec. 31, 1914, amounted to $3,195,697.

Empire United Railways, Inc., Syracuse, N. Y.—It is reported that the $1,083,000 of Rochester, Syracuse & Eastern Railroad three-year notes due on Feb. 16 are being retired by an issue of $690,065 of Empire United Railways, Inc., guaranteed gold bonds and through the sale of the first mortgage 5 per cent bonds of the latter company.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.—E. H. Rollins & Sons, Boston, are offering at 94 and interest, to yield about 5.75 per cent, $500,000 of first mortgage 5 per cent bonds of the Grand Rapids, Grand Haven & Muskegon Railway. These bonds are part of a closed first mortgage issue of $1,500,000, dated 1901 and due on July 1, 1926, and are an underlying divisional lien of the United Light & Railways Company. The subsidiary company owns and operates 47.26 miles of high-speed third-rail electric railway between Grand Rapids and Muskegon.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The California Railroad Company has authorized the Los Angeles & San Diego Beach Railway to issue a promissory note for $2,500 to refund a similar note held by the American National Bank, San Diego, and two promissory notes for $15,000 and $4,000 to refund a promissory note of $19,000 held by the Citizens' National Bank, Los Angeles.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—It is reported that the last assessment on the stock of the Oakland, Antioch & Eastern Railway has been postponed until March 29. A prior postponement was noted in the ELECTRIC RAILWAY JOURNAL on Feb. 6. The company has filed an application with the California Railroad Commission for authority to renew three promissory notes totaling $200,400 and to secure the renewals by the delivery of bonds on the basis of 60 per cent of the face value. The company also asks for authority to secure a note of $21,028 heretofore issued to the Union Switch & Signal Company by the delivery of bonds on the same basis.

Ogden, Logan & Idaho Railroad, Ogden, Utah.—As predicted in the ELECTRIC RAILWAY JOURNAL of Jan 16, the stockholders of the Ogden, Logan & Idaho Railroad have authorized a new mortgage to secure an issue of $10,000,000 of bonds. About $2,000,000 of this issue will be put out now to cover the present indebtedness of the company and the cost of the interurban extension to Preston, Idaho.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company has called for redemption on March 25, at 100¼ and accrued interest, $1,000,000 of one-year 5 per cent collateral trust notes dated Dec. 15, 1914, of which $4,000,000 are outstanding. The notes will be paid either at the Bankers Trust Company, New York, or at the office of the company in San Francisco. The company has sold to N. W. Halsey & Company and Harris, Forbes & Company, New York, $2,000,000 of general and refunding 5 per cent bonds, $5,000,000 of which are at present deposited as part collateral for the above-mentioned notes issued Dec. 15, 1914. Part of the proceeds of this bond sale will be used to retire the $1,000,000 of notes on March 25, thus placing the finances of the company on a more permanent basis. On the same date, the $4,000,000 of notes then maturing, for the payment of which the $4,000,000 of notes of Dec. 15, 1914, were issued, will be paid. On March 8 the company filed an application with the California Railroad Commission requesting authority to issue and place in the sinking fund provided under its general and refunding mortgage, dated Dec. 1, 1911, $367,000 of its general and refunding mortgage gold bonds.

Pennsylvania Railroad, Philadelphia, Pa.—The annual report of the Pennsylvania Railroad for the calendar year 1914 states that business conditions on the lines of the company were unsatisfactory during the year. The operating revenues of the Long Island Railroad amounted to $13,220,334, and the operating income to $3,318,434. The net income of this company showed a deficit of $494,131. In connection with the report Samuel Rea, president, issued a warning to the country in regard to regulation, saying that a great deal of constructive work must be accomplished before governmental regulation is placed on a satisfactory basis.

Peoria (Ill.) Railway.—Merrill, Oldham & Company, Boston, are offering at 96 and interest, to yield about 5.5 per cent, a block of first and refunded mortgage 5 per cent gold bonds of the Peoria Railway, dated 1906. Of these bonds there are outstanding $2,819,000, an additional $435,000 having been retired.

Public Service Corporation, Newark, N. J.—Clark, Dodge & Company, New York, are offering for sale, to yield about 5.55 per cent, 6 per cent perpetual interest bearing certificates of the Public Service Corporation of New Jersey. These certificates are in form similar to certificates of stock, but are in effect perpetual collateral trust bonds, being secured by $58,334,700 of stock collateral, or nearly three times the par value of the certificates outstanding. On the securities so pledged, the certificates have a lien prior to that of $47,000,000 of general mortgage 5 per cent bonds.

Utah Securities Corporation, Salt Lake City, Utah.—The Guaranty Trust Company, New York, as trustee for the Utah Securities Corporation, has repurchased $599,500 of ten-year 6 per cent notes in accordance with its recent invitation for tenders, as noted in the ELECTRIC RAILWAY JOURNAL of March 6. The average price paid was 80.499. An amount of $25,369,500 of these notes has been issued, of which $8,766,000 has been retired.

United Railways & Electric Company, Baltimore, Md.—It is reported that J. E. Aldred, former president of the Consolidated Gas, Electric Light & Power Company and the Pennsylvania Water & Power Company, will be elected a director of the United Railways & Electric Company. A substantial interest in the stock of the latter company was recently acquired by Aldred & Company, which firm is the fiscal agent for the first-named companies.

Western Railways & Light Company, Peoria, Ill.—Plans have been consummated for the merging of the Western Railways & Light Company with the Illinois Traction System. A total of 22.543 shares of common stock of the Illinois Traction System has been exchanged for 45,086 shares of common stock of the Western Railways & Light Company. The total amount of the Western Railways & Light Company issue outstanding was 45,218 shares.

Wheeling & Elm Grove Railroad, Wheeling, W. Va.—An amount of $17,000 of 5 per cent first mortgage thirty-year bonds of the Wheeling & Elm Grove Railroad, dated March 1, 1898, has been called for payment.

DIVIDENDS DECLARED

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Philadelphia (Pa.) Traction Company, $2.

Public Service Corporation, Newark, N. J., quarterly, 1½ per cent.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan., '15	$65,330	*$30,842	$34,488	$17,515	$16,973
1 " " '14	63,687	*31,333	32,354	17,358	14,996
12 " " '15	779,395	*374,728	404,667	209,275	195,392
12 " " '14	768,979	*348,911	420,068	207,603	212,465

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m., Jan., '15	$70,363	*$68,158	$2,205	$17,340	††$14,995
1 " " '14	75,568	*83,790	8,059	15,473	††23,532
7 " " '15	594,388	*535,095	59,293	120,646	††60,297
7 " " '14	616,906	*534,744	82,162	106,354	††23,164

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Jan., '15	$81,330	*$60,208	$21,122	$29,349	$8,227
1 " " '14	99,233	*58,352	40,881	27,653	13,228
12 " " '15	1,067,193	*701,579	365,614	341,105	24,509
12 " " '14	1,208,529	*716,738	491,791	301,335	190,456

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., Jan., '15	$274,752	*$164,178	$110,574	$38,719	$71,855
1 " " '14	272,026	*171,949	100,077	40,356	59,721
12 " " '15	3,069,024	*1,878,975	1,190,049	477,823	712,226
12 " " '14	2,995,411	*1,939,873	1,055,538	491,241	564,297

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., Jan., '15	$1,241,903	*$650,972	$590,931	$360,376	$230,555
1 " " '14	1,228,577	*666,548	562,029	344,108	217,921
12 " " '15	14,019,809	*7,534,320	6,485,489	4,229,121	2,256,368
12 " " '14	13,733,037	*7,695,878	6,037,159	3,896,143	2,141,016

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Jan., '15	$604,464	*$450,321	$154,143	$98,270	‡$77,503
1 " " '14	591,824	*460,336	131,488	88,374	‡64,488
7 " " '15	4,796,849	*3,547,521	1,249,329	687,977	‡713,141
7 " " '14	4,874,158	*3,573,768	1,300,390	625,527	‡828,217

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Jan., '15	$184,546	*$106,976	$77,570	$42,018	$35,552
1 " " '14	187,831	*125,854	61,977	44,144	17,833
12 " " '15	2,237,022	*1,334,853	902,169	497,545	404,624
12 " " '14	2,209,078	*1,353,997	855,081	471,385	383,696

NEW YORK & STAMFORD RAILWAY, PORTCHESTER, N. Y.

1m., Jan., '15	$23,072	*$24,635	$1,564	$7,876	††$9,417
1 " " '14	22,588	*24,129	1,541	7,800	††9,317
7 " " '15	237,880	*186,560	51,320	55,130	††3,515
7 " " '14	232,720	*179,723	52,998	53,893	††585

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Jan., '15	$35,495	*$44,233	$8,737	$8,236	††$16,348
1 " " '14	29,306	*49,868	20,562	5,226	††24,827
7 " " '15	260,611	*305,585	44,974	45,122	††88,734
7 " " '14	234,491	*345,873	111,382	36,777	††144,590

NORTHERN OHIO TRACTION & LIGHT, AKRON, OHIO

1m., Jan., '15	$280,839	*$181,979	$98,860	$50,251	$48,509
1 " " '14	270,961	*171,291	99,669	49,462	50,207

PORTLAND RAILROAD COMPANY, PORTLAND, MAINE

1m., Jan., '15	$73,370	*$51,895	$21,475	$22,549	†$1,074
1 " " '14	72,159	*52,505	19,654	23,242	†3,588
12 " " '15	1,046,053	*646,631	399,422	249,911	149,511
12 " " '14	1,036,975	*681,950	355,025	193,869	161,156

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Jan., '15	$489,713	*$261,404	$228,309	$182,361	$45,948
1 " " '14	582,610	*277,286	305,324	173,282	132,042
12 " " '15	6,180,274	*3,248,001	2,932,273	2,181,758	750,515
12 " " '14	6,752,754	*3,305,387	3,447,367	2,028,862	1,418,505

*Includes taxes. †Deficit. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Further Efforts Toward Regulatory Legislation—Labor's Attitude in Rock Island and Providence

The closing hours of the session of the Legislature of the State of Washington were enlivened by the controversy over the "jitney." The proponents of the bill to regulate the bus called the attention of both Houses to the numerous accidents to "jitney" bus patrons and to the financial irresponsibility of the drivers of these buses. It was contended that the patrons of the buses were entitled to the same protection as was afforded to the users of street cars. The proposal was to require the drivers of "jitney" buses to give a surety bond in the sum of $2,500. Those who favored the bill contended that a "jitney" driver who could not give a $2,500 bond was not sufficiently responsible to be permitted to engaged in hauling people. The bill passed both Houses, but was promptly vetoed by Governor Lister. On March 11 the measure was repassed over his veto by a vote of sixty-three to thirteen in the House and of twenty-eight to twelve in the Senate. The Governor contended that the regulation and control of the buses should be undertaken by the cities and towns, and stood out for the doctrine of home rule. He said that if the bill should be placed on the statute books it would be impossible to change or amend it in any way until a meeting of the Legislature in 1917. He said he appreciated the necessity for proper regulation and expressed the hope that the members of the Legislature from the cities of the first class would return to their respective cities and endeavor to have the city authorities pass such ordinances as would give to the public the protection to which it was entitled.

The Public Service Commission of the State of Washington, in a communication to the City Council of Seattle, states:

"We communicated some weeks ago with your honorable body with reference to the competition of the "jitney" bus, over which the commission has no jurisdiction. We called your attention to the fact that the operation of the "jitney" bus decreased the revenues of the company more than $2,000 a month. Just prior to the advent of the "jitney" we arranged with the company for improved service in Seattle, including service to the outlying districts. With the advent of the "jitney" we felt that the company should be permitted to adjust its business so as to be able to compete with the bus. Whether the company can render the service required and obtain a reasonable return upon its investment is a question that can be determined only by a valuation of the property of the company."

In this connection it is of interest to note that the Puget Sound Traction, Light & Power Company notified the Port Commission of the city of Seattle that the present agreement of the company with that body whereby the patrons of the Port Ferry are granted a single 5-cent fare over the Port Ferry and the Ferry Hill line in West Seattle would be discontinued by the company on the expiration of the present joint traffic arrangement on March 16. A. L. Kempster, manager of the company, in returning the unsigned agreement, wrote the commission as follows:

"After carefully considering this matter, we feel obliged to inform you that on the expiration of the present agreement we must discontinue the joint fare arrangement heretofore existing. We are forced to this conclusion owing to the very serious loss of revenue suffered by this company by reason of unregulated competition of the "jitney" buses, particularly within short-haul territory. The authorities have permitted this ruinous competition to continue in face of the fact that by so doing one of the heaviest tax-paying institutions and most potent factor in the up-building of the community is being crippled. With these facts before us, it becomes our duty to conserve our revenue in every reasonable manner. It is not our desire to work unnecessary hardship upon any section of the community. On the other hand, the curtailment of service in unprofitable territory and the withdrawal of privileges heretofore extended to different sections of the

city must of necessity prove burdensome to some. This is a condition which we regret but cannot escape."

Regulations for the operation of motor vehicles for public transportation, including provision for payment of 10 per cent of gross receipts to the municipality in which the line is operated, are laid down in a bill introduced in the Pennsylvania Legislature by Mr. Jones of Susquehanna, chairman of the public roads committee. By the terms of the bill all cars must take out regular State licenses and file with the commonwealth a list of all routes by streets or roads, a $10,000 bond for each machine operated for recovery of damages for death or injury and a statement of capacity of all vehicles operated. All operators must be of age. Before operating in any municipality the lines must arrange to pay 50 cents a month per car, to the treasurer of the municipality as a license fee. Cars operating on State highways are not required to have this extra license. Thirty days after Jan. 1 each line must file with the municipality granting licenses a statements of gross receipts, and pay 10 per cent for street maintenance. The Public Service Commission is given authority to regulate the lines. Fines are provided for violations.

Charles M. Talbert, director of streets and sewers of St. Louis, Mo., is preparing a "jitney" regulatory ordinanee. Realizing the need, however, of the immediate regulatory measures on account of the promiscuous manner in which the "jitneys" are running, he, together with President McPheeters of the Police Board, conferred on March 8 and drew up a set of tentative rules which will be enforced till a permanent ordinance is adopted. No "jitney" will be permitted to operate without its owner first having secured a permit from the city and subscribed to the regulations. Five principal features are covered. All chauffeurs must be examined as to their competency to handle a car. All cars will be examined to see that they are in proper condition. No speeding to obtain passengers will be allowed. There must be no overloading of cars, and passengers must be taken on and deposited at the curb, instead of the middle of the street, as many now are. In addition, all chauffeurs must obey the usual traffic laws applicable to other vehicles.

A temporary or emergency ordinance for the regulation of "jitneys" and other vehicles engaged in public transportation has been introduced in both Houses of the Council of Kansas City. The ordinance contains twenty-five sections. The more important sections relate to the character and qualifications of the operators of this class of public transportation service and clearly set forth their responsibility and liability in regard to protecting the lives of the people. They are required to secure from the city franchises to operate their vehicles and to indemnify the city in bonds to cover personal injury. The city reserves the right to designate the routes to be traversed by the cars, the operating hours and schedules, to determine the qualifications of operators and to regulate the rates of fare.

In Atlanta regulatory legis'ation in the form of an ordinance prepared by P. S. Arkwright, president of the Georgia Railway & Power Company, and introduced by Councilman Lee is pending before a committee of the City Council. None of the terms of the ordinance is severe. It would require a bond to the city in the sum of $10,000 for two cars or less under the control of one operator and $20,000 for more than two cars. It contains no provision against overcrowding. In the course of an interview published in the automobile section of the Atlanta *Constitution* of March 14 the following was quoted as coming from E. W. VanDuzen, sales manager of the Mitchell Motor Sales Company:

"The assertion that "jitneys" are not lighted at night is a small detail that can easily be remedied by the expedient of lighting them. I believe they ought to be lighted. As for undesirables riding in them, as has been suggested might happen, the "jitney" is only a common carrier similar to any other common carrier in the character of the passengers it carries, and I see no reason for suspecting that the "jitneys" would carry a larger percentage of undesirables than any other common carrier."

Under the terms of an ordinance introduced in the City Council of Savannah, Ga., "jitney" buses are required to run on established routes, maintain regular schedules, pay a license to the city and furnish indemity bonds to guarantee responsibility for accidents.

An ordinance regulating the operation of the "jitney" has been prepared for submission to the City Council of Houston, Tex. The measure provides, among other things, for a $10,000 accident insurance or personal bond, license according to capacity of car for carrying passengers, regulation requiring cars to run on one line only and on a schedule, prohibition of passengers being carried on running boards, fender or on car doors, a fare of not more than 5 cents and a requirement that cars must not stop more than 2 ft. from the curb.

No "jitney" licenses will be issued by the city of Nashville, Tenn., until the City Commission has disposed of the ordinance which it has under consideration. This has been amended to provide that the applicants for such licenses shall first deposit with the city a $5,000 bond.

The Pacific Electric Railway, Los Angeles, Cal., has announced increases in service on a number of its lines, and General Manager McMillan is quoted as stating that "we are prepared to give the 'jitney' bus a run for its money." In this connection the Los Angeles *Times* said recently:

"Following a month of rather strenuous retrenchment the Pacific Electric Railway announcement of improved service is interpreted by many as evidence that the 'jitney' bus, like the seven-year locust, has about run its cycle here. As proof of this it is alleged that the number of light cars that are going back to the dealers under the mortgage clause after brief but hectic careers on our streets, is in excess of the purchases. But if the 'jitney' had seen its best days in the Southwest, in spite of Councilman Coddling, it is becoming an increasingly live issue in the East."

Interesting instances of labor's attitude toward the "jitney" bus are furnished at Rock Island, Ill., and Providence, R. I. At a recent meeting in Rock Island of the Tri-City Federation of Labor, it was voted to put the "jitney" on the unfair list. The Davenport and Rock Island locals of the street railway men's unions entered a joint resolution asking that the federation go on record against the use of the buses by union men. The men fear that the intrusion of the "jitney" may lead to union men being forced out of employment by the curtailment of the electric railway service. On March 6 there were fourteen automobiles in competition with the Tri-City Railway.

In Providence a committee of labor men has been appointed to investigate the "jitneys" and to report to the Central Trades & Labor Union. Pending the outcome of the investigation it was voted to "ask members to refrain from using the 'jitney' service and to discourage as far as possible the use of the service by others." Members of Local Division No. 618 of the Amalgamated Association of Street & Electric Railway Employees defended the Rhode Island Company and said that consideration should be shown it until the affairs of the company could be readjusted under the federal decree for the segregation of the properties of the New Haven Railroad. "Jitney" service was referred to as "unregulated and unrestricted competition" and it was also stated that the operators are unorganized and that no responsibility attaches to them or the owners of the cars.

The idea of profit-sharing has been extended to the "jitney." In Houston, Tex., coupons are being given to patrons by one operator. On the Montgomery line in that city ten cars called "coupon" cars are being operated. A sign on the windshield of each of these cars announces that the passenger will receive a coupon with every fare paid and that five coupons will be exchanged for one ride.

The menace of the bus to pedestrians has been strikingly stated by Paul Beemer, city passenger and ticket agent of the Union Pacific System at Ogden, Utah, who recently returned to Ogden from a trip to the Pacific Coast. He said of the "jitney": "It sure stimulates the mind to active thinking, trains the eye for spectacles of peculiar character and inspires the belief that to be knocked off your footing means resignation to the inevitable. Owners anxious to clean up as much coin as possible while the fire of the fad is burning hottest take any chances to get the money, allowing the cars to become packed with human beings whom the driver distributes along the route of travel without even bringing the car to a stop."

Reference has been made previously in the ELECTRIC RAILWAY JOURNAL to the local associations of "jitney" bus

owners and to the strength and influence that they have exerted in their own behalf in a political way. According to William A. Sears, manager of the Motors Service Company, St. Louis, Mo., with twenty-two cars in service in that city, plans are under way for the organization of a national "jitney" bus association to be designed as a clearing house of information for the owners and operators of "jitneys."

Other automobile men than John N. Willys, of the Willys-Overland Company, have gone on record recently in regard to the "jitney." Among them is H. H. Franklin, president of the Franklin Automobile Company, Syracuse, N. Y. Mr. Franklin is quoted in part as follows:

"As crude as the 'jitney' may be, it is the beginning of a radical change in transportation. Fight it as they may, the street railways cannot stop the growth of the service. The rapid development of public automobile transportation during the next five years will be another wonder in the marvelous progress of the automobile. While at the present time the 'jitney' is any old automobile, it will not be long before cars well adapted to the service will appear. Moreover, the service will not be confined to cities. It will eventually cover the country from city to village and village to city, as do the interurban railways."

The letter addressed by W. Clayton, vice-president and managing director of the San Diego (Cal.) Electric Railway, to Stephen P. Kieffer, chairman of the Oakland Chamber of Commerce & Commercial Club Consolidated, in reply to his request for facts and opinions on the "jitney" bus situation, has been reprinted in pamphlet form. This letter is a review of the cause and effect of the "jitney" and the necessity for its regulation. Mr. Clayton concluded his letter as follows:

"If the 'jitney' bus is all they claim it to be, it will put the street car out of business by legitimate competition, but the competition street cars are suffering from to-day is not only not legitimate, but it is neither fair nor honest on the part of the people, the cities or the State. Street cars are willing to meet any legitimate competition if the people will give them a square deal, and I believe it is to the interest of the people, the municipalities and the State itself to see that the street railway systems of California are treated with the same measure of honesty and protection that the people themselves have demanded should be extended to them through the State and the State Railroad Commission."

LIMITING CAR CAPACITY

A meeting of the Board of Health of New York was held on March 15 to receive the protest of the New York Railways and the Brooklyn Rapid Transit Company against the orders of the board concerning the Eighty-sixth Street cars of the former company and the Graham Avenue cars of the latter. The Third Avenue Railway had agreed previous to the hearing to obey the order of the health commissioner with regard to Fifty-ninth Street by running three extra cars during the rush hours. Commissioner Goldwater stated that when the board issued an order it was presumed to be reasonable until it was proved otherwise, and that the burden of proof rested with the company protesting. He said the board was prepared to prove its case and is necessary would go to court about it. Dr. Goldwater would not admit that Mr. Peacock, counsel for the New York Railways, had any right to inspect the samples of germs, but said that he might do so. On March 16 the New York Railways notified the doctor that it would accept his order concerning the running of more cars on the Eighty-sixth street crosstown line. Dr. Goldwater wrote to Frank Hedley, vice-president and general manager of the company, that for the first few days, until passengers grew accustomed to the new regulations, policemen would assist the company's employees in observing the rules.

The Health Board had issued an order against the carriage of more than half as many standees as seated passengers by the Staten Island Midland Railway on some of its cars. Placards bearing an appeal from Dr. Goldwater to the citizens of Brooklyn, asking for their assistance and co-operation in his campaign had been posted at various points along the route of the Graham Avenue line and at the bridge terminals.

DETROIT CAPACITY ORDINANCE

The Common Council of Detroit, has passed an ordinance requiring 30 cu. ft. of air space for each passenger on the cars of the Detroit United Railway. Exception is made where cars are operating over the same tracks half a minute or less apart. The Council passed the ordinance without any hearing before any committee, and neither the street railway nor any other interested party was permitted to make known its objections. The same ordinance was defeated in committee when it was proposed several months ago, largely because the city police commissioner informed the Aldermen that he did not have sufficient men to enforce the ordinance.

The ordinance requires the board of health to measure each car and placard it with the number of passengers which may be admitted. It is estimated that the result of the ordinance will be to prohibit a standing load in excess of 40 per cent of the seated load. The new regulation becomes effective after the measure has been signed by the Mayor and then properly published.

The company in a statement to the public through its official publication, calls attention to the condition on its interurban lines and makes it plain that the surplus riders under the ordinance who board the cars beyond the city limits will be required to leave at the city limits and wait for other cars, and it suggests that a sufficient number of police be stationed at the city limits to make sure that these riders leave the cars. The employees of the two largest manufacturing concerns in the city will be affected, as both plants lie beyond the corporate limits of the city.

INCREASE IN FARES

Rate of 8 Cents, with Seven Tickets for 50 Cents, Announced by Blue Hills Street Railway, Effective April 15

The Blue Hills Street Railway, Canton, Mass., has issued the following announcement regarding changes in fares on its line effective on April 15:

"It appears to us that the only way to continue to serve the public with safety and to their reasonable satisfaction is to endeavor to increase the company's earnings. We believe that the least burdensome way to do this is to increase the unit of fare rather than to attempt to shorten the fare limit or introduce additional fare limits. We have therefore decided to increase the unit of fare to 8 cents per passenger, but to sell tickets at the rate of seven for 50 cents, which is practically a 7-cent fare.

"The new rate will go into effect on April 15 unless some order is issued by the Public Service Commission, whose decision in such matters is final.

"We hope that the change will bring in $8,000 or $10,000 in additional revenue. The increase from a 5-cent fare to a 6-cent fare resulted in about an 8 per cent increase in earnings, and, based on this figure, with the other information which we have on the general situation, we are led to believe that the above estimate is probably not far from what will prove to be the fact.

"The need of additional earnings is imperative. While the road in many respects is better off than it was at the time of the previous change in fare, and while it has reduced its deficit somewhat during that period, the cost of operation and the necessary increase in maintenance are so high that not enough is left after paying interest charges to take care of betterments, which we know must be done in the next few years in order to serve the public properly.

"We should be glad if we could hold out a hope that the increased earnings would result in dividends to the stockholders. They invested $300,000 in cash some sixteen years ago. If they had placed the money in a savings bank at that time they could now draw out $540,000. Instead they have a practically worthless security on their hands.

"The property has always been operated with the utmost economy consistent with safety and reasonable service, so that no saving can be hoped for in that direction. The tendency is rather upward in such expenditures, as is well known to every one.

"To increase fares is not a pleasant task, as it is extremely difficult to convince people of the necessity of such a move. We do hope, however, that the people of Canton and Stough-

ton who have had the service rendered by the Blue Hill Street Railway so many years below cost, will believe that we are acting for their ultimate best interests in seeking additional revenue.

"The investment, the earnings and the expenses are all matters of public record and the details are in our office, open to the inspection of any patron who desires to convince himself of the reasonableness of our position."

Fare Reduction Denied.—The Public Utilities Commission of Maine, has dismissed the petition of William H. Peaseless and others asking for a reduction in fares from 10 cents to 5 cents between Dunstan and Saco. The petition, in formal language charged that the Cumberland County Light & Power Company maintained discriminatory rates over the part of the line where the reduction was desired.

Accidents in Ohio.—The report of the Public Utilities Commission of Ohio for February shows that four persons were killed on interurban electric railways. Two were employees on duty and two were passengers. In all fifty-five persons were killed on steam lines, of which thirty-three were trespassers, twelve were employees on duty, two were employees off duty, one was a passenger, three were employees on the right-of-way and four were killed in highway-crossing accidents.

Washington Trail-Car Order.—The Public Utilities Commission of the District of Columbia has suspended, until July 1, 1915, Section 13 of Order No. 21 requiring separate conductors for trail cars in order to permit observations to be made with a view to determining whether the order should be amended by striking out Section 13. The Washington Railway & Electric Company and the Capitol Traction Company contended at the recent hearing before the commission that a single conductor made for safety.

Free Ride Order Amended.—The Public Utilities Commission of the District of Columbia has decided that Order No. 19 in regard to free transportation on street railways and other carriers in the District shall be amended to read as follows: "That hereafter no street railway or similar common carrier shall furnish free intra-District transportation other than to its own employees and to members of the metropolitan police, crossing police, park police, and fire department of the District of Columbia when in uniform and in the performance of their duties."

New Transfer Privilege.—An agreement has been reached between officials of the United Railroads, San Francisco, Cal., and of the Municipal Railways of that city permitting the exchange of transfers between the Stockton Street line of the Municipal Railway and the Fourth Street line of the United Railroads, on the basis of 50 per cent to each line. This gives the city lines immediate connection with the Southern Pacific Depot at Third and Townsend Streets and obviates the necessity for extension of the municipal system to this point, which would include an undesirable crossing of Market Street at a point already congested. It is probable that this new arrangement will also mean the discontinuance of the transfer agreement between the two systems at Geary and Kearny Streets as well as at the Geary and Larkin Street junction. Transfers have heretofore been exchanged at these two points on a 3-cent and 2-cent basis, in favor of the private company, and the exchange has cost the city something more than $1,000 a month.

New Wage Scale in Des Moines.—On Feb. 23 the employees of the Des Moines (Ia.) City Railway approved a new agreement with the company which went into effect on March 1. Under it the wage scale of the motormen and conductors is increased 1 cent an hour. The men will receive 25 cents an hour the first year, 26 cents an hour the second year and 30 cents an hour after the third year. The wages of the carhouse, shop and power house employees are increased 1 cent an hour and in some cases the increase amounts to several cents. Some of the men, particularly oilers and wipers, have been receiving from $2.10 to $2.30 for a ten-hour day. These hours have been reduced to eight hours and a uniform wage of $2.40 has been agreed upon. The increase for the men will average for from 7 to 9 cents. Women car cleaners have had their pay increased from $1.58 to $2 for an eight-hour day. Seniority rights are also to be applied to carhouse and shop employees.

Mr. Arnold on Service Standards.—Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, testifying before the Public Utilities Commission of Illinois on March 10, outlined his personal views of rush-hour standard of service in Chicago. He divided the so-called "rush hour" into five parts as follows: For the first and last parts, consisting of twenty-five minutes each, fifty-three passengers per car, allowing 11 sq. ft. to each standing passenger. For the second and fourth parts, consisting of twenty-five minutes each, seventy-three passengers, allowing 4¼ sq. ft. to each standing passenger. For the third or middle part, this being the crest of the rush period, an average load not to exceed the number of seats and one standing passenger to each 3½ sq. ft. Mr. Arnold said that during the crest of the rush-hour period, the 600 largest cars would have a capacity of eighty passengers each, according to this idea of a service standard. He believed the present terminal facilities of the surface lines in Chicago to be such as to allow reasonable and adequate service.

Safety on Public Service Railway.—The Public Service Railway, Newark, N. J., is carrying an advertisement in the daily newspapers calling attention to its record for safety. The advertisement is 15 in. wide by 10 in. deep, and deals particularly with the commendation received from the judges in the contest for the Anthony N. Brady medal. The company says that during three years 1,194,793,266 passengers were carried without a single fatality due to collisions between cars or derailments. After reciting the object, the offer and the conditions of the Brady award the company said in part: "The Public Service Railway began its efforts to promote and safeguard the lives of its patrons and employees years before any contest was thought of. Its entry for the Brady medal was an incident. Its main purpose was, is and will continue to be to transport the public safely. The company management and the company employees will pursue the policy of doing everything possible to eliminate accidents and conserve life and health. It asks for the co-operation of the public so that the good work may be maintained for the benefit of all."

Accidents in New York and New Jersey in February.—According to the report of the National Highway Protective Society eighteen persons were killed during February by automobiles on the streets in New York City, nine of these being children under seventeen years of age. Electric railways caused the death of five and wagons four, as compared with ten by electric railways and two by wagons in February a year ago. Edward S. Cornell, secretary of the Highways Society, states that on account of the great increase in the number of automobiles it is necessary that all operators of automobiles should be licensed. The society will have a bill introduced along those lines in Albany. During February six persons met their death by automobiles, three by electric railways and one by wagon on the streets and highways of New York State outside of Greater New York, as compared with three by automobiles and four by electric railways last year. In New Jersey six persons were killed by automobiles and one by electric railway.

Survey of Transit Conditions in Brooklyn.—The Public Service Commission for the First District of New York has published in pamphlet form the survey of transit conditions on the Brooklyn Rapid Transit System submitted to the commission by Joseph Johnson, chief of its transit bureau. The survey is dated Dec. 31, 1914, and is addressed to Edward E. McCall, chairman of the commission. It contains 126 pages and cover. The report was rendered in connection with the inquiry before the commission regarding the service on the surface lines of the Brooklyn Rapid Transit Company, and its contents and recommendations have been referred to previously in the ELECTRIC RAILWAY JOURNAL. The final argument of the company before the commission in connection with this inquiry was made before the commission on March 8, on which date D. A. Marsh, counsel for the Brooklyn Heights Railroad and other surface companies, summed up the case of the company. Mr. Marsh's brief in this connection was referred to in the ELECTRIC RAILWAY JOURNAL of March 13, 1915, page 532.

Personal Mention

Mr. E. Blaine Moore, formerly chief engineer of the Consolidation Coal Company, has been appointed assistant general manager of the Monongahela Valley Traction Company, Fairmont, W. Va.

Mr. W. L. Martin, who has been in charge of the legal department of the Alabama Traction, Light & Power Company, New York, N. Y., has been appointed vice-president and chief counsel of the company.

Mr. James O. Watson, formerly general manager of the Monongahela Valley Traction Company, Fairmont, W. Va., has been made vice-president. Mr. Watson will continue in active management of the railway.

Mr. Smith Hood, formerly general superintendent of the Monongahela Valley Traction Company, Fairmont, W. Va., has been made general manager to succeed Mr. James O. Watson, who becomes vice-president, as noted elsewhere.

Mr. C. K. Morrell, has resigned as superintendent of lighting with the Kentucky Traction & Terminal Company, Lexington, Ky., and has been succeeded by Mr. Washington Reed, lately of Smithfield, Va. Mr. Morrell, it is said, will enter business in Lexington.

Mr. James Mitchell, president of Alabama Traction, Light & Power Company, New York, N. Y., has been elected president of Alabama Power Company, the principal operating subsidiary, to succeed Mr. Frank S. Washburn, who became chairman of the board.

Mr. C. C. Cole, who has been day dispatcher of the Lewiston, Augusta & Waterville Street Railway, at Augusta, Me., has been appointed division superintendent of transportation of the company, succeeding Mr. Sherman W. Dunn. Mr. Cole was with the company for seven years.

Mr. L. M. Levinson, formerly manager of the Mineral Wells Traction & Light Company, Mineral Wells, Tex., and manager of the Shreveport (La.) Traction Company, has been engaged by the Bryan-College Interurban Railway, Bryan, Tex., to supervise the electrification and start operations under the new plan of the company.

Mr. Sherman W. Dunn, who has been connected with the Lewiston, Augusta & Waterville Street Railway as division superintendent of transportation, has resigned that office but will continue with the company at Augusta, Maine. Mr. Dunn has been connected with the company for twenty-three years. He entered its employ in the carhouse of the Augusta, Hallowell & Gardiner Railroad two years after that company commenced operating.

Mr. H. S. Newton, until recently general manager of the Mesaba Railway, Virginia, Minn., has been appointed general manager of the Ohio Valley Electric Railway, Huntington, W. Va., to succeed Mr. W. W. Magoon, resigned. Before becoming connected with the Mesaba Railway, Mr. Newton was general manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., for nine years. He was graduated from Ohio State University as an electrical engineer and has served with the General Electric Company, the Wheeling (W. Va.) Railway, the Syracuse (N. Y.) Railway, the Syracuse Consolidated Street Railway, the Syracuse Rapid Transit Company, the Syracuse, Lakeside & Baldwinsville Railroad and the Beaver Valley Traction Company, Pittsburgh, Pa.

Mr. Robert Trimble, first vice-president of the American Railway Engineering Association, was elected president at the annual convention in Chicago on March 16, 17 and 18. Mr. Trimble was born at Butler, Pa. After completing a public school course he entered the Western University of Pennsylvania (now the University of Pittsburgh), where he remained for three years. In July, 1875, he entered the service of the Pennsylvania Railroad as a messenger in the office of the chief engineer at Pittsburgh. He was then successively chainman, rodman, levelman, transitman, draftsman, assistant engineer and principal assistant engineer. He was made chief engineer of maintenance of way of the Pennsylvania lines in 1903. His jurisdiction is over the Northwest system of the lines west of Pittsburgh.

Mr. William D. Ray has resigned as vice-president and manager of the Northern Indiana Gas & Electric Company's properties at Hammond, East Chicago, and Whiting, Ind., to become general manager of the newly organized Pennsylvania Utilities Company, with headquarters at Easton, Pa. The latter company operates in nearly fifteen communities contiguous to Easton, containing many quarries and large manufacturing plants. Mr. Ray entered the electrical field as electrical engineer for the Chicago & Northwestern and Northern Pacific railroads, and later was connected with the World's Columbian Exposition, Chicago, as assistant superintendent of electrical operation. In 1894 he was general superintendent of the Everett (Wash.) Street Railway, and later he became sales engineer for the Loraine Steel Company. Subsequently he was electrical engineer for two traction lines operated by the Detroit Construction Company, following which he superintended the construction of the Grand Rapids, Grand Haven & Muskegon Railway. In 1908 he was appointed contract agent of the Sanitary District, Chicago, and in 1910 went to Hammond for the Northern Indiana Gas & Electric Company.

Mr. Oscar T. Crosby has been appointed to take general charge of the distribution of supplies for the Commission for Relief in Belgium, and also a member of the executive committee. Mr. Crosby's headquarters will be in Brussels, and, as general director of distribution, he will succeed Mr. A. N. Connett, chief engineer and joint-director of J. G. White & Company, Ltd., whose appointment was mentioned in the Electric Railway Journal for Dec. 26, and whose business affairs permitted him to take the appointment only temporarily. The Commission for Relief in Belgium, whose work in that country Mr. Crosby will direct, is an American organization exclusively, with headquarters at 71 Broadway, New York. It is supported by voluntary contributions and has a fleet of forty-three vessels constantly carrying food and other supplies from America to the destitute in Belgium, estimated at present to be about 1,500,000 persons. The commission has been officially recognized by both the Allies and Germany. Mr. Crosby resigned from active electric railway management some few years ago, so that he has the time to devote to this work, and for it his extensive experience in administrative affairs and his knowledge of the French and German languages eminently fit him. Since his return from an exploring trip in Borneo last year Mr. Crosby has been very much interested in the proposed International Court of Decree and Enforcement, under which it is proposed to establish an international court at the Hague or some other suitable place, with sufficient international military and naval force to carry out its decrees. He has written a pamphlet advocating this plan which has been widely circulated and has been translated into a number of languages, including Japanese and Chinese. A joint resolution committing the United States to the acceptance of this plan was introduced in the Senate last month by Senator Shafroth, and a similar resolution was introduced in the House. These resolutions did not succeed in passing at the recent session of Congress, but Mr. Crosby hopes that they will be introduced at the next session. Among others who have actively been engaged with Mr. Crosby in support of this plan has been Mr. Elihu Root.

OBITUARY

J. C. Rothery, of the Canadian Northern Railway, was found dead on March 10 near the Grand Trunk Railway tracks at Weston, Ont., having apparently fallen from a train. Mr. Rothery was born in Glasgow sixty-seven years ago. His first practical experience in railway building was gained during the construction of the Niagara Gorge Railway between Niagara Falls and Lewiston. He was afterward appointed manager of the line, and when the Niagara Falls, Park & River Railway was merged with the International Railway, Buffalo, he was made general manager of the system at the Falls. He next superintended the construction of the International Bridge across Niagara River at Lewiston. Upon the completion of the bridge he was appointed general manager of the East Liverpool Railway & Light Company, East Liverpool, Ohio, where he remained until 1910. He then entered the service of the Mackenzie and Mann interests as general manager of the Monterey Railway, Light & Power Company, Monterey, Mexico, and later supervised the building of the electrical line of the Toronto & Eastern Railway on the north shore of Lake Ontario. Since that time he has been superintending general construction work for the company, which is a Mackenzie and Mann interest.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Panama (Pa.) Traction Company.**—Application for a charter has been made in Pennsylvania by this company to take over the property of the defunct Sugar Grove Electric Railway and extend the line through Youngsville, Sugar Grove, Jamestown, Lakewood, Panama, Sherman and probably Findlay Lake and North East.

***Petersburg & Appomattox Railway, Petersburg, Va.**—Chartered in Virginia to build an electric railway from Petersburg to City Point, 5 miles. Capital stock, $100,000. Officers: T. M. Wortham, president; B. W. LaPrade, vice-president, and W. W. Alexander, secretary and treasurer.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise from the Council for an extension on Central Avenue in Los Angeles.

Louisville, Ky.—The Board of Public Works of Louisville has begun advertisement of the franchise for electric railway rights and privileges represented by the extension of the Chestnut Street line of the Louisville Railway. The franchise is to run for twenty years and an upset bid of $500 is provided for.

Geneva, N. Y.—The Geneva, Seneca Falls & Auburn Railroad has asked the Council for a franchise to double-track Exchange Street from Seneca to the New York Central tracks in Geneva.

Lancaster, N. Y.—The Buffalo & Depew Railway has asked the Council for a franchise to extend its lines from its present terminus, through Ellicott Road and Central Avenue to the New York Central Railroad tracks in Lancaster.

Cincinnati, Ohio.—The City Council has adopted an ordinance requiring the Cincinnati Street Railway and the Cincinnati Traction Company to extend the Warsaw Avenue route along Glenway Avenue from Wilder Avenue to Seton Avenue in Cincinnati. Council's action was on the request of the Citizens' Club, of Price Hill, and the West Hills Allied Improvement Association.

Linden, Ohio.—Council committee on railroads has approved the ordinance creating the electric railway route from the Leonard Avenue viaduct to Linden and also to Shepard. The term of the franchise is to be twenty-five years and if the terms offered by the East Linden Electric Railway Company, which has applied for the franchise, are satisfactory, the franchise will be granted the company. The Shepard line will compete with the Columbus, New Albany & Johnstown Traction Company.

Three Rivers, Que.—The Three Rivers Traction Company has received a twenty-year franchise from the Council in Three Rivers. This is part of a plan to build a 30-mile railway in Three Rivers. The present intention of the company is to build 5½ miles of track within the city limits. [Aug. 1, '14.]

Toronto, Ont.—The Forest Hill Electric Railway has asked the Ontario Legislature for an extension of time on its franchise in which to build its projected railway on Forest Hill Road, Toronto, northerly, and northwesterly to 2½ miles north of Eglinton Avenue, also on Eglinton Avenue to 1 mile west of Dufferin Street and northerly on Dufferin Street 2½ miles. W. E. Grierson, Toronto, is interested. [Feb. 27, '15.]

Montreal, Que.—The Montreal & Southwestern Railway & Power Company has applied to the Quebec Legislature for an extension of time for the building of this projected line from Adirondack Junction, on the Canadian Pacific Railway, along the St. Lawrence River to the International boundary, and another line from Adirondack Junction, on the New York Central Railroad, to Sunder, Quebec. The provisional directors are: V. Casson, L. Dansereau, A. Geoffrion, G. N. Cusson, R. Gange, Montreal, Quebec. The company has power to operate by steam or electricity.

TRACK AND ROADWAY

Florence & Huntsville Interurban Railway, Florence, Ala.—Surveys have been begun and preliminary arrangements are being made by this company on its 75-mile line to connect Florence, Rogersville, Athens and Huntsville. There will be three power stations and the repair shops will be located at Florence. Capital stock, authorized, $100,000. Officers: S. Jacobs, Birmingham, president; Alan Jemison, vice-president; Thurston H. Allen, Florence, secretary and general manager, and T. W. Pratt, Huntsville, treasurer. Headquarters: Florence. [Dec. 19, '14.]

Pacific Electric Railway, Los Angeles, Cal.—Plans are being made to begin work soon laying new tracks on North Fair Oaks Avenue in Pasadena. The company has placed in operation its extension to connect Riverside, Arlington and Conora. [Nov. 14, '14.]

Capital Traction Company, Washington, D. C.—Plans are being made by this company to build a line on Seventeenth Street in Washington.

Washington & Maryland Railway, Washington, D. C.—This company has filed with the Public Utilities Commission a request for permission to extend its lines from Third Street and Kennedy Street to Thirteenth Street and Ohio Avenue northwest in Washington.

Atlanta & Carolina Railroad, Atlanta, Ga.—Arrangements are being made by this company to complete this electric line in the near future. The right-of-way has been purchased and the roadbed has been completed for a part of the way.

Lula-Homer Railroad, Lula, Ga.—Bids are being received until March 30 by this company to build its 14-mile proposed line from Lula to Homer. The track is to have 3000 ties per mile and 60-lb. relaying rails. D. G. Zeigler, engineer. [Nov. 7, '14.]

Chicago & Northern Interurban Railroad, Chicago, Ill.—No definite plans have yet been decided upon by this company when work will be begun on its line to connect Fox Lake, Lake Geneva, Barrington, Des Plaines, Park Ridge, Niles Center, Chicago and smaller towns between these cities. Headquarters: 127 North Dearborn Street, Chicago, Ill. [Feb. 27, '15.]

Illinois Traction System, Peoria, Ill.—A branch line to extend from near the Martin stop, 1½ miles north of Lincoln, and eastward to Wapella, 4 miles north of Clinton, is being planned by this company.

***Elkhart, Ind.**—It is reported that H. E. Bucklen, Elkhart, Ind., will shortly apply for a supplementary charter for an electric railway line between the Indiana-Ohio state line and Toledo. Should this line be built it will form a through route between Toledo and Chicago in connection with the Bucklen roads and others already in operation.

Charles City Western Railway, Charles City, Ia.—Electrifying 18.5 miles and building 7½ miles of extensions will be completed by this company by Nov. 1.

Tri-City Railway, Davenport, Ia.—Rails have been ordered for the Fourth Street line which this company will build in Moline.

Caney Light & Railway Company, Caney, Kan.—Within the next thirty days this company expects to purchase one carload of poles, 25 ft., 30 ft. and 35 ft. in length. J. C. Miller, manager.

Louisville & Interurban Railway, Louisville, Ky.—An extension of the Orell line into West Point is being planned by this company.

Southwestern Traction & Power Company, New Iberia, La.—Plans are being made by this company to build soon a line from Jeanerette to St. Martinville.

St. Tammany & New Orleans Railway & Ferry Company, New Orleans, La.—This company, which has been operating a motor-car railway between Mandeville, Abita Springs and Covington, La., 13½ miles, will, it is stated, convert its railway to electric operation. Reconstruction of the track has been begun, and the erection of an electric power plant will be begun at once.

Winnipeg (Man.) Electric Railway.—The Manitoba Legislature is being asked to amend the company's charter by adding to its powers.

Union Street Railway, New Bedford, Mass.—Work has been begun by this company laying new rails on Kempton Street in New Bedford.

International Railway, Buffalo, N. Y.—Plans are being made by this company to double-track its line on Virgil Avenue as far as Kenmore Avenue in Buffalo.

Ithaca (N. Y.) Traction Corporation.—This company is making surveys of the Mitchell Street and Stewart Avenue lines in Ithaca.

Wallkill Transit Company, Middletown, N. Y.—Plans are being considered by this company for an extension from Midway Park to connect with the extension of the Newburgh line from its Walden terminal, and taking in the towns in the adjacent territory, including Maybrook, Montgomery and Campbell Hall.

Long Island Railroad, New York, N. Y.—President Ralph Peters, of this company, has replied favorably to an inquiry made by the Public Service Commission as to whether his company would entertain a proposition on behalf of the City of New York for the extension of the City Rapid Transit Railroad from Corona to and through Flushing, by making a connection with its tracks at a point in Flushing Meadows, near the interlocking tower, at Flushing Junction; thence over its tracks on the Whitestone Branch, by way of Flushing (Bridge Street), to Whitestone, and by way of Flushing (Main Street) to the city limits, at Little Neck. Mr. Peters in his reply says he is willing to co-operate with the city in providing such service by permitting the use of his company's tracks through the territory described.

New York, N. Y.—New bids are desired April 9 by the Public Service Commission, First District, 154 Nassau Street, for the construction of Section 4 of the routes 4 and 36, a part of the Broadway, Fourth Avenue Rapid Transit Railroad in Manhattan. The work consists of a two, four and six track underground railroad northerly under Seventh Avenue, from Fifty-first Street to Fifty-ninth Street, and easterly under Fifty-ninth Street to a point 22 ft. west of westerly building line of the Seventh Avenue extended.

Geneva, Auburn & Seneca Falls Railroad, Seneca Falls, N. Y.—Plans are being made by this company to double-track its line from the Seneca Street switch to the New York Central crossing in Geneva.

Asheville Power & Light Company, Asheville, N. C.—An extension of its railway lines in Kenilworth Park in Asheville is being planned by this company.

***Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.**—This company, the incorporation of which is announced elsewhere in this issue, is making plans to begin work soon on the proposed 49-mile electric line from Ossipee to Durham. The route includes 58 villages. It is stated that interests connected with the Piedmont Trust Company and the North State Realty Company, both with headquarters at Burlington, and their interests are back of the railway plan, also that after the charter is obtained the several counties to be traversed will be asked to call elections on proposed bond issues to make subscriptions to the stock of the railway company. Junius Harden, Burlington, is among those interested.

Consolidated Railways, Light & Power Company, Wilmington, N. C.—First rails have been laid by this company from its loop at the entrance to the Navy Yard toward North Charleston, a distance of 2 miles.

Pictou County Electric Company, Ltd., Stellarton, N. S.—Work will be begun about April 1 on the extension to Parkdale.

Northern Ohio Traction Company, Akron, Ohio.—New track will soon be laid by this company on West Tuscarawas Street in Canton. A 90-lb. T-rail on steel ties and concrete foundation will be used for the new track. Plans are going forward whereby work will soon be begun on both the Arlington Street line from Spicer Street to Market Street and the extension of the East Exchange Street line in Akron.

Cleveland, Ohio.—Residents of the eastern section of Cleveland, Ohio, are urging the extension of the Payne Avenue line to connect with the 105th Street line. Street Railway Commissioner Peter Witt is opposing this on the ground that the cost will be $25,000. He informed a meeting of the citizens that he would under no condition approve of the extension. Conferences relating to the proposed new East Cleveland franchise have been postponed until arrangements are complete for improvements on Euclid Avenue.

Dayton, Ohio.—It is reported that the electric railway companies of Dayton, Ohio, will spend $100,000 this season in the construction of tracks and plans for rerouting cars. At a conference of the presidents of the companies on March 10 plans were tentatively arranged for rerouting in order to allow the changes that have been planned on Main Street, between Monument and Fifth Streets in Dayton.

Ohio Valley Traction Company, Portsmouth, Ohio.—Contracts are being awarded by this company to build the extension from Sciotoville to Ironton.

New Castle Traction Company, Youngstown, Ohio.—Plans are being considered by this company to build a line on Atlantic Avenue and also to construct a terminal loop on the public square in New Castle.

Oklahoma & Interstate Railway, Oklahoma City, Okla.—Plans are being made by this company to award contracts and to begin work within the next sixty days on the 130-mile line to connect Columbus, Galena, Baxter Springs, Miami, Centralia, Collinsville and Tulsa. Surveys have been completed between Columbus and Baxter Springs and are now under way between Columbus and Tulsa. John R. Rose, Oklahoma City, president. W. K. Palmer, Kansas City, chief engineer. [Feb. 13, '15.]

Aylmer, Ont.—A by-law will be submitted to the ratepayers in the near future, authorizing the guarantee of their share of the bonds of the proposed hydro radial from Tillsonburg to London.

Hamilton, Ont.—The Board of Control has decided to ask the Provincial Hydro-Electric Railway to survey route for radial line from Hamilton to Fort Erie.

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—It is reported that work will soon be begun by this company on the Perth and Smith Falls section of this projected railway. The line will extend through Rideau Ferry, and not as originally planned. [Feb. 20, '15.]

Toronto, Barrie & Orillia Railway, Toronto, Ont.—This company has applied to the Ontario Legislature to authorize the reduction of their capital stock and for an extension of time for the building of the projected line in Barrie, Ont., northerly to Orillia and southerly to Toronto.

***Toronto, Ont.**—Plans are being considered by citizens in and around Baysville, Ont., for the construction of a Hydro-Electric Radial Railway from Bracebridge through to the Wa Wa Hotel and ultimately extending to the Algonquin Park headquarters in the Muskoka district. The project has been endorsed by the Council and Board of Trade of Bracebridge and by the Councils of Baysville, Sherbourne, Nightingale and Clintock Townships. The projected line from Bracebridge to the Wa Wa will be about 24 miles, and power can be easily secured from any one of the numerous falls along the river. There are no engineering difficulties in the way. Sir Adam Beck has promised to give the matter every consideration.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—Plans are being made by this company to build an extension on Bridge Street of the Falls division from Erie to Victoria Avenue, in Niagara Falls.

Willamette Valley Southern Electric Railway, Portland, Ore.—This company has placed in operation its line between Oregon City, Beaver Creek, Mulino, Molalla and Mount Angel. G. B. Dimmick, president. [Jan. 2, '15.]

Easton (Pa.) Transit Company.—During the next few weeks this company plans to rebuild its track on its South Side line, a distance of about 3 miles, using creosoted ties and 110-lb. Dudley section T-rail. These rails are manufactured by the Bethlehem Steel Company.

Conestoga Traction Company, Lancaster, Pa.—Surveys have been completed by this company for a new line 13 miles in length to be a branch of the Lancaster and Coatesville division. The new line will begin about 1 mile east of Conestoga Park, near Millinger's Church, follow along the old turnpike to the Horse Shoe Road, and along it to Witmer, whence it will cross the country to Bird-in-Hand, and thence along the old Philadelphia turnpike to Intercourse.

*New Castle, Pa.—James L. Freeble, Pittsburgh, and associates are considering plans to build an electric railway from the corner of Haywood Street in Farrell to Mercer and New Castle.

Monongahela (Pa.) Railways.—Hereafter the company operating the railroad between Brownsville and Fairmont, W. Va., will be known as the Monongahela Railways Company, the name having been officially changed from the Monongahela Railroad Company the first of this month. The work of completing the line near Fairmont is now in progress and it is expected that service will be established in the near future.

Eastern Pennsylvania Railways, Pottsville, Pa. — Announcement has been made by this company of the abandonment of plans by the company to build an electric railway over Broad Mountain to connect Pottsville with Shenandoah. This line will now be constructed by the Schuylkill Electric Railway.

Reading Transit & Light Company, Reading, Pa.—Improvements to its lines in and about Reading, which are expected to cost about $200,000, will be begun by this company as soon as the weather permits.

Montreal & Southern Counties Railway, Montreal, Que.—Work will be begun soon on the extension to Youville Square in Montreal.

Ogden, Logan & Idaho Railway, Ogden, Utah.—The stockholders of this company have authorized the issue of bonds for extension and other improvements on the company's lines in the sum of $10,000,000. It is said that the company will use $2,000,000 to pay off present obligations and to make immediate extensions, the remainder being reserved for future corporate purposes. Included in the work which is contemplated for the future is the construction of an interurban extension to Preston, Idaho.

Clarkston, Wash.—A. G. Nortz, promoter of the proposed electric railway through the Lewiston-Clarkston Valley, has announced that construction on the line will be begun at once. The contract has been awarded to Edward McGarry, Lewiston, to build the section of the line across the Snake River. [Jan. 19, '15.]

SHOPS AND BUILDINGS

Brantford (Ont.) Municipal Railway.—The commissioners have approved of this company's plans for a new passenger station to be built on the site of the old powerhouse on Colborne Street in Brantford. Work on the station will probably be started at once.

Hershey (Pa.) Transit Company.—This company's new carhouse in Hershey is nearing completion.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—This company has awarded a contract to the Shand Engineering Company to build a new carhouse at Main Street and Rice Street in Columbia.

POWER HOUSES AND SUBSTATIONS

Ohio Light & Power Company, Shawnee, Ohio.—Within the next two months this company expects to erect new substations in Shawnee and Straitsville for the purpose of distributing electricity received from the Newark plant. When completed the local plant will be closed down.

Oil Belt Terminal Railroad, Oklahoma City, Okla.—Plans are being made by this company to build a new power plant on Lagoon Creek, between Oilton and Jennings, Okla. Frank Brown, president. [Oct. 17, '14.]

Reading (Pa.) Transit Company.—An order has been placed by this company with the Westinghouse Electric & Manufacturing Company for three 185-kva., single-phase, sixty-cycle, 2300-volt high tension, rotary low tension, outdoor type O. I. S. C. transformers.

Southwestern Traction Company, Temple, Tex.—A new substation is being built by this company in the western section of Temple.

Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va.—Work will be begun in the spring by this company on a new generating station to take the place of the present power house in Parkersburg. Sanderson & Porter, New York City, engineers, are expected to have preliminary details ready within sixty days.

Manufactures and Supplies

ROLLING STOCK

Toronto (Ont.) Civic Railway is considering the purchase of ten more cars at a cost of $100,000.

Illinois Traction System, Peoria, Ill., has ordered from the Haskell & Barker Car Company fifty hopper bottom gondola cars, fifty-ton capacity.

Brantford (Ont.) Municipal Railway has ordered three single-truck pay-as-you-enter city cars from the Preston Car & Coach Company, Ltd., Preston, Ont.

Toronto (Ont.) Railway on March 8 placed in operation seven cars fitted with cross seats. Only one of the cars is new, the others being old cars remodeled and reconstructed.

Alberta & Great Waterways Railways, Winnipeg, Man., Can., has purchased two McKeen 55-ft. steel combined passenger-baggage 200-hp gasoline motor cars for service in northwestern Alberta.

New York State Railways, Rochester, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 13, 1915, as asking for bids on one sample car, has ordered this equipment from the G. C. Kuhlman Car Company.

Ogdensburg (N. Y.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 27, 1915, as expecting to purchase four one-man cars, has ordered this equipment from the Wason Manufacturing Company.

Carolina & Yadkin River Railway, High Point, N. C., has ordered from the Southern Car Company one electric locomotive for the purpose of moving cars over the tracks of the North Carolina Public Service Company in the city of High Point.

Boston & Worcester Street Railway, Boston, Mass., noted in the ELECTRIC RAILWAY JOURNAL of March 6, 1915, as expecting to purchase new cars, has ordered five interurban closed cars from the Osgood-Bradley Car Company, and five open cars from the Wason Manufacturing Company. The open cars will be equipped with rattan seats.

Ogden, Logan & Idaho Railway, Ogden, Utah, has ordered a 50-ton Baldwin-Westinghouse electric locomotive. This locomotive will be quipped with Westinghouse field control No. 562-A-5 motors and type HLF control, arranged for full speed operation on 750 or 1500 volts. The locomotive will be used for freight service and with 25 per cent adhesion will exert a maximum tractive effort of 25,000 lb.

TRADE NOTES

Fairmont Machine Company, Fairmont, Minn., has changed its name to the Fairmont Gas Engine & Railway Motor Car Company.

Carlton R. Mabley, for the past five years general manager of the R. I. V. Ball Bearing Company, has joined the selling organization of the S.K.F. Ball Bearing Company.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has received an order for gears and pinions for the four new cars which have recently been ordered by the Kansas City, Clay County & St. Joseph Railway.

American General Engineering Company, New York, N. Y., has secured a renewal contract on its A. G. E. reinforced trolley wheels for the 1915 requirements of the Brooklyn (N. Y.) Rapid Transit Company.

G. Drouve Company, Bridgeport, Conn., has received an order for "anti-pluvius" puttyless skylights and "straight-push" sash operators for the new group of buildings which the Stone & Webster Engineering Corporation is constructing for the Massachusetts Institute of Technology, Boston, Mass.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., advises that the United Railways of St. Louis has placed contracts for the following open hearth titanium treated rails to be rolled during the second quarter of this year: with the Lorain Steel Company, 1400 tons; with the Illinois Steel Company, 1350 tons; with the Pennsylvania Steel Company, 800 tons. The Los Angeles (Cal.) Railway has also ordered from the Lorain Steel Company 500 tons and from the Pennsylvania Steel Company 1000 tons. All

of these rails are to be treated with 0.1 per cent titanium, added in the form of ferro carbon-titanium.

Prepayment Car Sales Company, New York, N. Y., held its annual meeting on March 16, and the president's report showed that a very satisfactory business had been done during the past year. Reference was made to the development of safety devices in connection with car door and step operating mechanism and the further development of pneumatic devices for electric railway and interurban cars. The report further states that owing to the increase in business during the past year the company had taken over full control of its sales, with its own special representatives, and had cancelled the sales agency of the Electric Service Supplies Company, which theretofore was general sales agent for the company.

Thomas R. Woulfe has resigned as manager of the light and power department of the Cleveland, Southwestern & Columbus Railway, effective April 1, 1915. He will enter into partnership with Frank B. Rae, at present consulting engineer, 315 Engineers' Building, Cleveland, under the name of the Rae-Woulfe Company, consulting, electrical and mechanical engineers. Mr. Woulfe has held his present position for three years. He was formerly superintendent of the gas and electric property of the Illinois Northern Utility Company at Sterling, Ill.

Westinghouse Electric & Manufacturing Company has received the following orders for electrical equipment: Corpus Christi Street & Interurban Railway, No. 323 motors and K control; Burlington (Vt.) Traction Company, No. 101-B-2 motors and K-28-B control; Tidewater Power Company, Wilmington, N. C., No. 323-A motors and K-10-J control. The Shore Line Electric Company has ordered ten double truck cars from the Wason Manufacturing Company, to be equipped with Westinghouse No. 632-B M ventilated motors and type HL control. The Charleston & Interurban Traction Company will soon place in service six new passenger cars equipped with Westinghouse No. 306 motors and K-36-J control.

Union Switch & Signal Company, Swissvale, Pa., at the annual meeting of its stockholders on March 9 in the Westinghouse Building, Pittsburgh, Pa., elected the following directors: J. D. Callery, J. J. Donnell, William McConway, J. R. McCune, J. R. McGinley, M. S. Rosenwald, T. W. Siemon, W. D. Uptegraff and H. H. Westinghouse. The newly elected directors later went into executive session and chose the following officers for the ensuing year: President, Mr. Uptegraff; vice-president and treasurer, Mr. Siemon; secretary and assistant treasurer, Thomas S. Grubbs; assistant secretary, G. F. White. The new executive committee that was appointed is composed of Messrs. Callery, Donnell, McCune, Siemon and Uptegraff.

McIntosh & Seymour Corporation, Auburn, N. Y., has two of its new Diesel type oil engines on exhibition at the Palace of Machinery at the Panama-Pacific Exposition. The larger of these oil engines is of 525 brake-hp and is the largest and most powerful of its class in the exposition. It is using fuel oil supplied at the header of Machinery Palace. At the price of 92 cents per barrel of 42 gal. this fuel will give about 850 brake-hp hr., or say 525 kw-hr., at a cost of $1. The machine is of the four-cylinder type, and, operating on the four-stroke cycle, develops this power at 165 r.p.m. The smaller Diesel engine shown by the McIntosh & Seymour Corporation is a four-cylinder set of 280-brake-hp capacity designed to turn at 200 r.p.m. In character it is distinguished from the larger set chiefly by its greater compactness due to the higher running speed.

Royal Manufacturing Company, Rahway, N. J., announces that hereafter it will sell its cotton and wool waste under guarantees that are asserted to be new in this field. One guarantee is that the purchaser will always get exactly what he orders. This will be accomplished by providing the customer with a sampling folder which contains six white and six colored grades of cotton waste. A second guarantee is that the tare of "Royal" waste will be limited to 6 per cent, the company refunding the difference on all bales upon which the tare is overweight. A third guarantee is that of furnishing bales to exact weight. The determination of the company to conduct its business on a high plane is shown also in the adoption of a trade-mark, "Our Waste Is Your Gain," in the stamping of the word "Royal" on each steel band and the adoption of the phrase "Look for the Brand on Each Steel Band." The packing of the bales has been standardized, clean, light burlap and new steel bands being used instead of rope or shabby burlap.

James Walker and George H. Cressler have announced their association under the firm name of Walker & Cressler, consulting engineers, with offices at 742 First National Bank Building, Chicago. Mr. Walker has been engaged in consulting practice in Chicago for ten years, being identified during that period with work in connection with the Chicago Elevated Railways, the Chicago Surface Lines, the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals, various electric railroad, lighting and power companies, and financial institutions interested in public utility properties. Mr. Cressler has been the past ten years vice-president and chief engineer of the Kerr Murray Manufacturing Company, Fort Wayne, Ind.

Southwark Foundry & Machine Company, Philadelphia, Pa., announces that it has secured the exclusive United States license to manufacture the Harris valveless engine, Diesel principle, which will hereafter be known as the Southwark-Harris valveless engine. The engine will be built in sizes from 75 brake-hp to 1000 brake-hp for both marine and stationary service. The recent extensive improvements which the company has made to its plant and equipment insure the proper facilities for the manufacture of this engine. The company has added to its engineering staff Leonard B. Harris, the inventor of the Harris valveless engine, as consulting engineer and naval architect, and his extensive experience in power engineering, especially in the marine field, will be available for all prospective customers. J. P. Johnston, who has been interested in and connected with the development of the Harris valveless engine, will also be associated with the company in charge of its oil engine sales. The Southwark Foundry & Machine Company will also continue to manufacture a full line of steam turbines, d.c. and a.c. generators, centrifugal air compressors, centrifugal blowers, turbine pumps, hydraulic pumps, hydraulic presses, steam hydraulic presses, surface, jet and barometric condensers and air pumps.

ADVERTISING LITERATURE

Economy Welding Machine Company, Kansas City, Mo., has issued a catalog which describes and illustrates its portable welding outfits which are equipped with welding and carbon remover torches.

Whiting Foundry Equipment Company, Harvey, Ill., has issued a large sheet which contains a reprint of the rules for safely operating cranes as issued by the National Founders' Association.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin E-35, which supersedes Bulletin D-30, and which describes and illustrates its Universal electric drill for operating on direct or alternating current.

Ohio Brass Company, Mansfield, Ohio, in its January-February, 1915, *O-B bulletin* illustrated several of the difficult features of overhead work constructed by the Memphis (Tenn.) Street Railway, in which O. B. overhead materials are used.

Atlas Preservative Company of America, New York, N. Y., has issued a catalog describing its methods for using "Atlas A" weed killer and track preservative. Through the elimination of track vegetation the performance of section gangs is confined by the aid of this method to the essential upkeep of track structure without the usual interruptions that result from the necessity of removing vegetation. The equipment for sprinkling the weed-killer, photographs of which are shown in the catalog, consists of one or more tank cars fitted with spraying apparatus and all necessary accessories for handling the chemical. The catalog contains a number of pairs of illustrations taken on several railroads showing their weed-infested condition, before applying the preservative, and their total absence from vegetation several months after application, which are self-explanatory in demonstrating the effectiveness of the weed killer. A repellent compound, designed to prevent cattle from grazing on the treated area, is used wherever advisable and is included in the service given.

Traffic Direction Block System

of automatic signaling for Electric Railways



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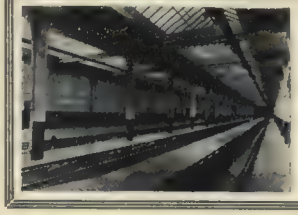
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KINNEAR ROLLING STEEL DOORS

Installed in the new Tri-City Car House

Illustrated above is the recently completed car house of the Tri-City Railway and Light Company situated at Rock Island, Illinois. This new car house, up-to-date in every particular, was built to replace a structure burned last year.

An important factor in the fireproofing of this new building is the Kinnear Rolling Steel Doors inclosing the entrance ends of all bays.

Modern car house construction demands Kinnear Doors because they are fireproof, easily operated, and involve practically no maintenance expense. Write for booklet "Car Barn Doors."

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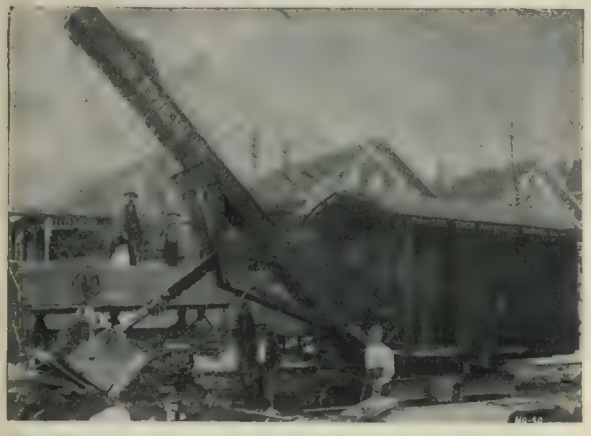
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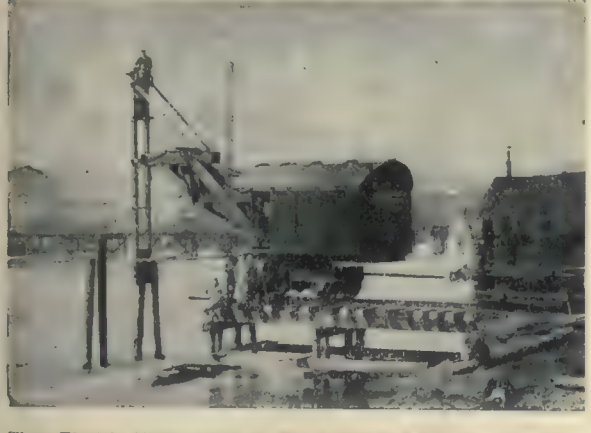
Showing application of the Thew Prying Motion in "breaking the bond" and handling 13 in. concrete, Cincinnati.



Thew Shovel making a shallow cut for track foundation, Indianapolis. Note pieces of concrete, rocks, etc.



Thew Electric Shovel grading for side track, St. Louis. Note level floor obtained with small amount of hand work by two laborers.



Thew Electric Shovel owned by The Rockford & Int. Ry. Co., Rockford, Ill., equipped for driving piles. Change can be made in ½ day.

WORK

for the

THEW

Electric Railway Shovel

means

deep or shallow cuts, track trenching, grading interurban road beds, tearing up concrete and track ballast, removing old rails and ties, rehandling materials to cars, and even driving piles (as the lower illustration shows). The success of this full-circle-swing type shovel with electric railways has been due not only to its generally good construction, but to such features as the **horizontal crowding motion** of the dipper, and its **powerful** prying action.

Upon request, we will send you our special electric railway pamphlet containing photographs and cost-figures dealing with Thew shovel operation. Write today.

The THEW Automatic Shovel Co.

Lorain, Ohio

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From Coast to Coast—



Copyright Detroit Pub. Co.

Sky Line New York City

Indianapolis Portable Welder and G

From the Atlantic to the Pacific on electric railways big and little, where track replacements and car equipment renewals range from dollars to many thousands, the INDIANAPOLIS PORTABLE ELECTRIC WELDER is effecting the most surprising savings.

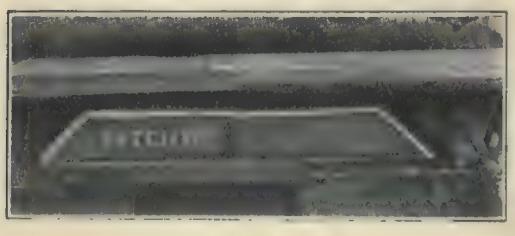
"Maximum Economy" in the operation of Electric Railways is impossible without the Indianapolis Welder and Grinder.

Reclaim worn special work and cupped joints—good as new, quickly—at minimum cost.

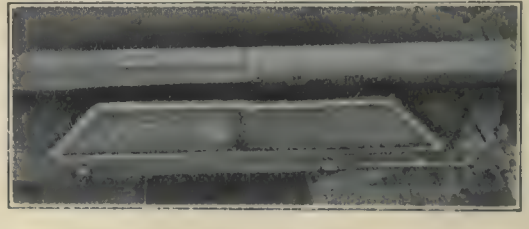
New Track laid with Indianapolis Welded joints—will never cup or require joint or bonding maintenance.

Old Track—made good for years—for less than the cost of ordinary temporary repairs.

Look carefully at the map—the users are in the majority.



Cupped Rail



Cup Filled in and Reground

INDIANAPOLIS SWITCH

New York Chicago Kansas City Spokane

he Indianapolis Welder



Exposition Sky Line San Francisco

ıder Salvages Track and Equipment

Such universal adoption in two years is proof of the extraordinary value and merit of the Indianapolis Method.

NOTICE TO THE MINORITY

(Those not yet using The Indianapolis Economy Twins.)

Any road operating four cars or over can't afford to be without them.

No piece of equipment on your line can yield such dividends. No appropriation necessary; they are paid for from the savings of the Maintenance fund.

You do have use for the Method.

Don't want to hurry you, but now is the best time for several reasons.









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A PRODUCT FOR EVERY PURPOSE



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Varnished Tapes

Used in the manufacture and repair of high grade motors, dynamos, etc. When high internal heat and unusual voltage strains will be encountered, this tape is especially suitable.

Our process of "aging" keeps this tape "live" for months when carried in stock.

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The film, tacky but not smeary, **sticks and stays stuck.** Furnished in two grades.

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Made to meet Underwriters and other specifications requiring direct rubber coating on the wires.

These tapes have smooth surface, are entirely free from pin holes and are very adhesive.

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The Packard Electric Co.

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(41)

Better Rail Bonding Plus Greater Savings



We are prepared to prove to you—
By records of actual work or—
By demonstration on your track—

That the use of Prest-O-Lite for the Oxy-Acetylene welding of bonds makes it possible for one man and two helpers to apply eighty bonds per day.

That these bonds will "stand up" better than bonds applied by any other process. Once applied, the oxy-acetylene bond is practically a part of the rail, and its electrical efficiency does not decrease through years of use. This positive permanence, ease and speed of installation, at very low expense, means a heavy decrease in your cost of bonding.

Bonds of suitable design for application by this process are supplied by leading bond manufacturers. Welded bonds will not corrode at the terminals. They *cost less* and *last longer* than any other type of bond.

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We furnish a thoroughly high-grade welding apparatus for $60.00, not including acetylene cylinders, which are extra, and are furnished under a liberal service plan. Truck and special equipment for cutting operations at extra cost.

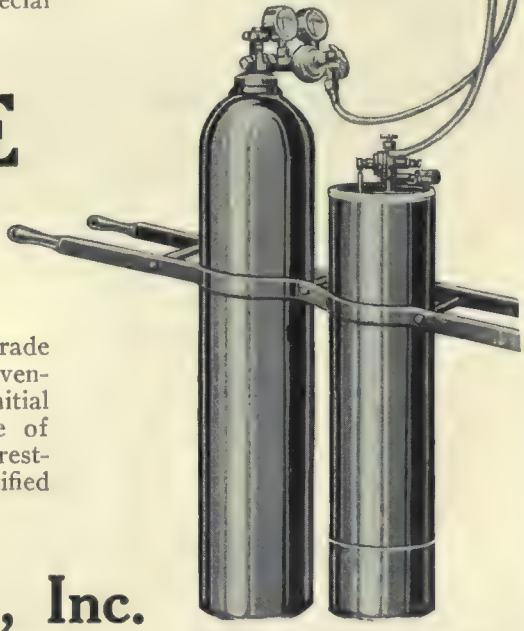
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One large traction company employs this method of carrying welding cylinders (Oxygen and Prest-O-Lite). Four bonds may be applied from one location. A light hand car can also be employed. When bonding a long stretch of track, full cylinders may be distributed in advance.

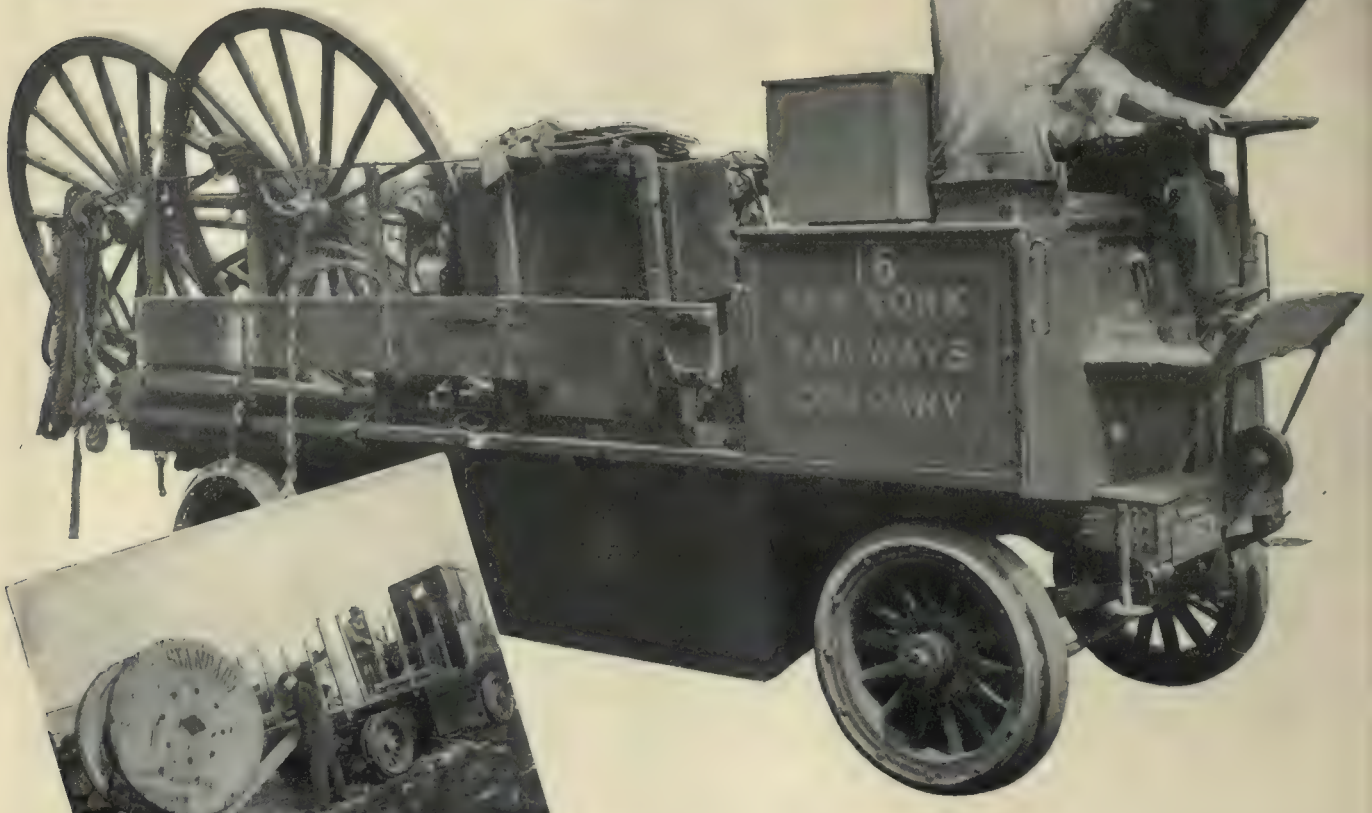
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NOT TO WEED —IS INEFFICIENT

TO WEED BY HAND —IS EXTRAVAGANT

TO WEED WITH **TRACKOLINE** IS EFFICIENT AND ECONOMICAL

¶ The day of hand weeding is past, thrown into the discard by the advent of TRACKOLINE, a time-tested, proven method of eliminating weed growth by chemical means.

¶ TRACKOLINE is a scientifically compounded chemical preparation which is a positive destroyer of every type of vegetation. It kills the entire plant, tops, roots and seeds, quickly, positively and permanently.

¶ It effectually sterilizes the roadbed so that a new crop cannot grow again for an entire season. A year's rains are required to dissolve TRACKOLINE from the soil sufficiently to permit weed growth, even from seed.

¶ On hundreds of roads, in all sections of this country, and in the tropics, TRACKOLINE has demonstrated its absolute efficiency.

¶ It kills every type of weed growth—Johnson-grass, ragweed, bind-weed—any form of vegetation, from clover to cactus, will be destroyed by TRACKOLINE.

¶ It is unconditionally guaranteed to be harmless to livestock. It is absolutely non-injurious to ties, rails or track superstructure.

¶ The cost of weeding with TRACKOLINE is less than that of any other method, yet it gives you what no other method can give you—absolutely clean tracks from one year's end to the other.

¶ Full particulars on request.

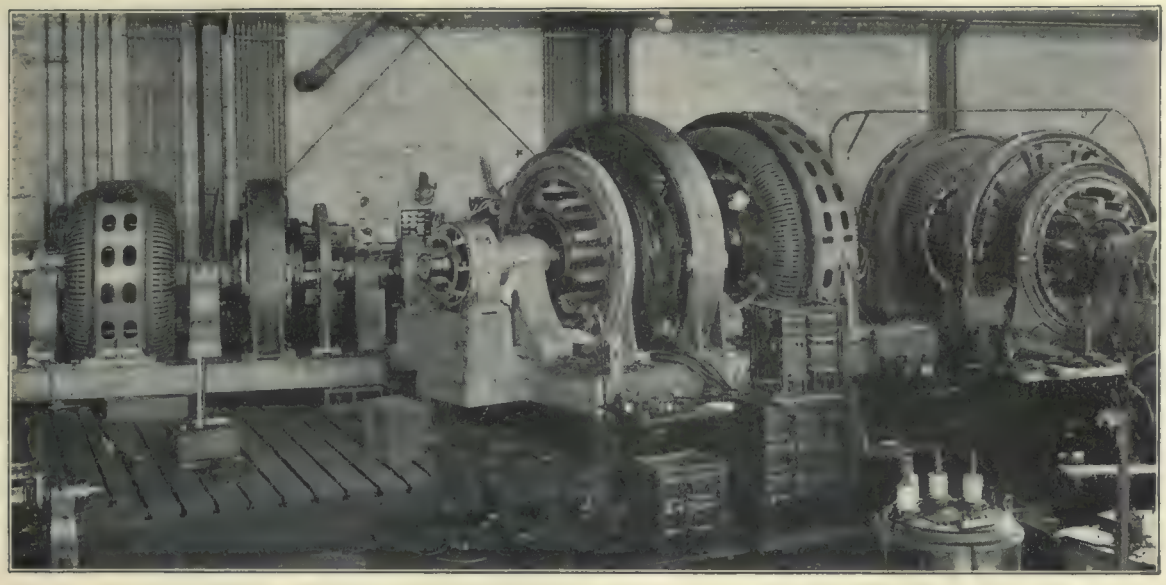
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COMMERCIAL CHEMICAL COMPANY

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given each set before shipment, is rigorous and very thorough, but their reputation for correct design and careful construction is due to their service record:

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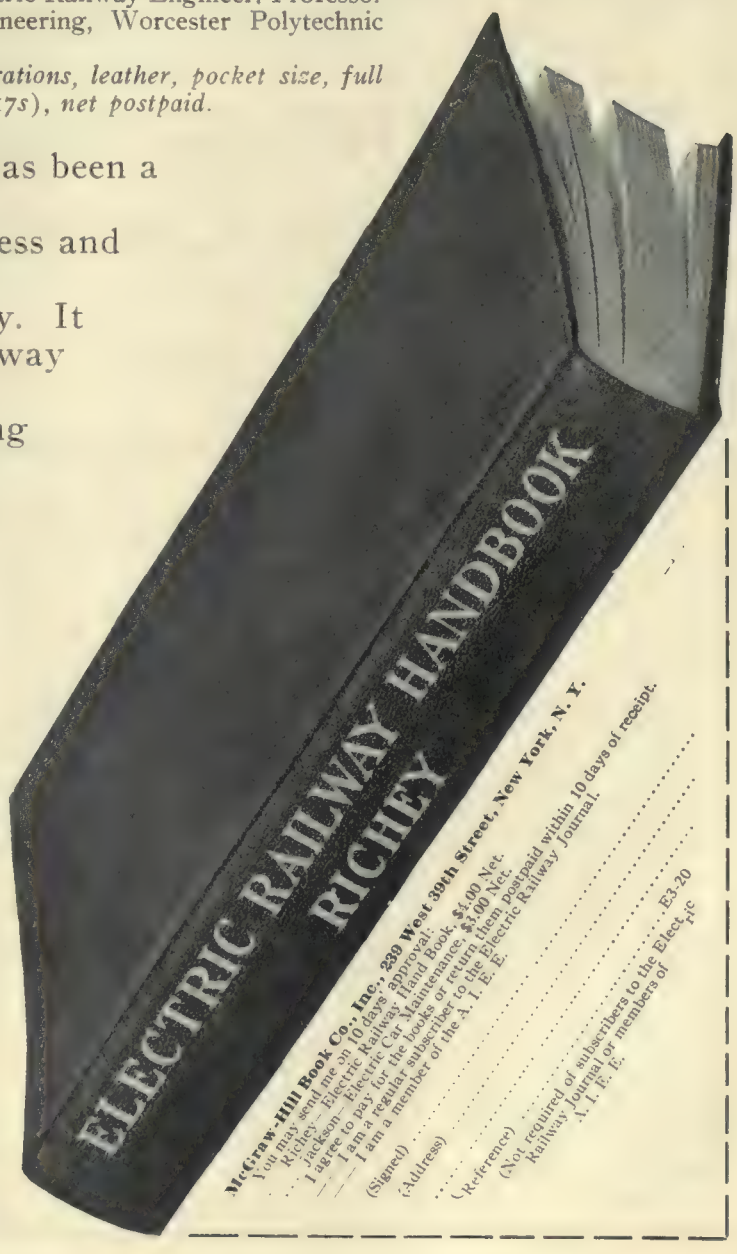
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At Indianapolis Traction & Terminal Shops. Oxwelding on Broken Gear Suspension Lug

Every road has in its scrap pile discarded parts which may be put into 100% condition quickly and at low cost.

Reclaiming discarded equipment from the scrap pile means not only conserving the original investment, but avoiding an unnecessary replacement cost.

In other words, there is no question that the biggest part of your scrap pile can be made practically as good as new by use of

The OXWELD Process of Welding and Cutting Metals

By this process worn and broken parts can be repaired quickly and cheaply—ready to do full service, thus saving the cost of new equipment.

Note the illustrations. These cases are typical of hundreds of savings, large and small, which can be made in any shop, by reclaiming the scrap pile.

Some Savings on the Indianapolis Traction and Terminal Co.



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There is profitable work for a Davis-Bournonville Welding and Cutting outfit in the shops of every Electric Railway, Lighting and Power plant.

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It will quickly pay for itself many times over on large and small repairs, new construction, general plant and equipment maintenance—

It will pay for itself in the parts saved from the scrap heap by welding—from the reduced lost time on repairs or waiting for new parts on a break-down—

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It has practical development, long experience, record for efficiency, **and competent instruction** back of it.

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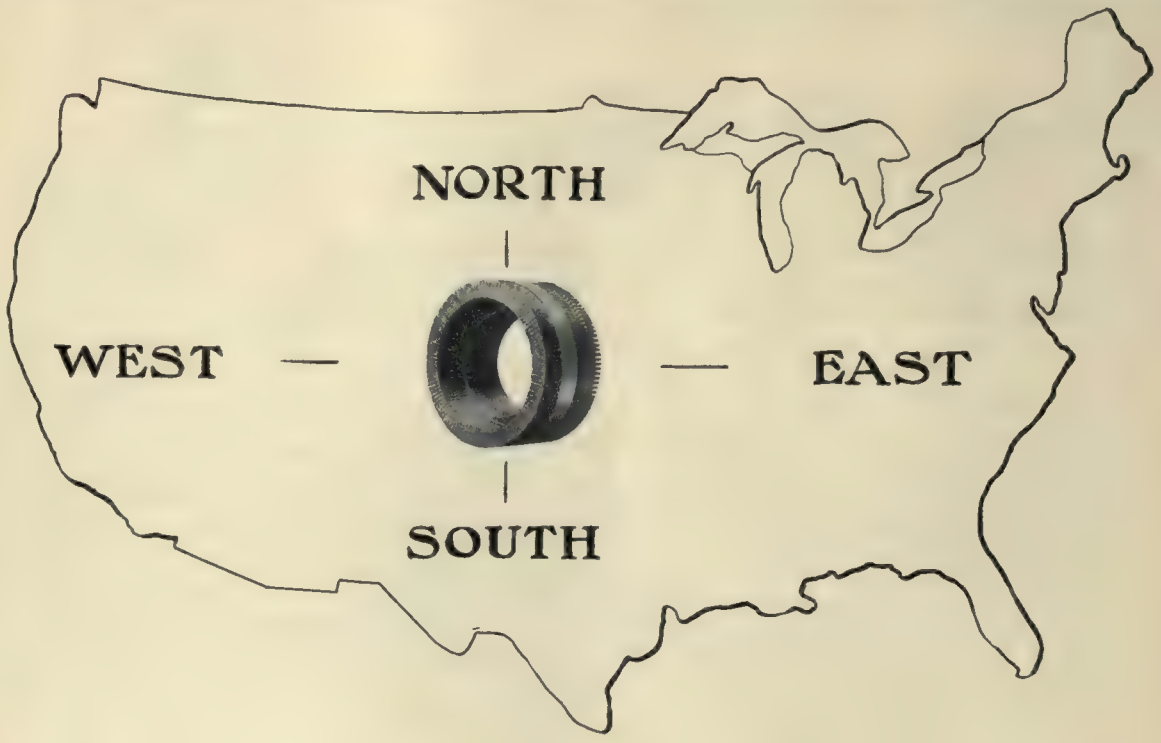
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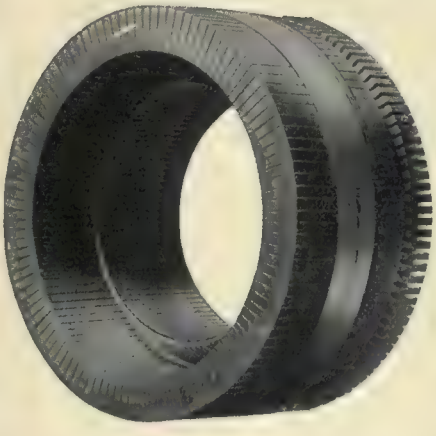
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Made permanently tight by hydraulic pressure. This precludes arcing at the brushes.

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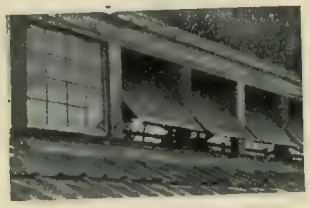
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Mica, nothing but "Canadian Amber" to insure softness and even wear.

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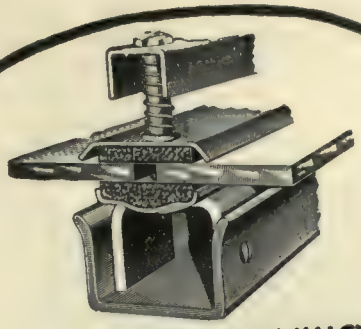
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"STRAIGHT-PUSH"
Sash Operators
PATENTED



"ANTI-PLUVIUS"
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Puttyless Skylights

on the Roofs



of the New Cleveland Railway Shops



30,000 sq ft.
"Anti-Pluvius"

4,000 ft.
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Connecticut Co.
Rhode Island Co.
New York City Rys.
Los Angeles Gas & Electric Co.
Portland Ry., Light & Power Co.
Mt. Hood Electric Ry.

The G. Drouvé Co., Bridgeport, Conn.

180 North Dearborn St., Chicago

3148

COLUMBIA

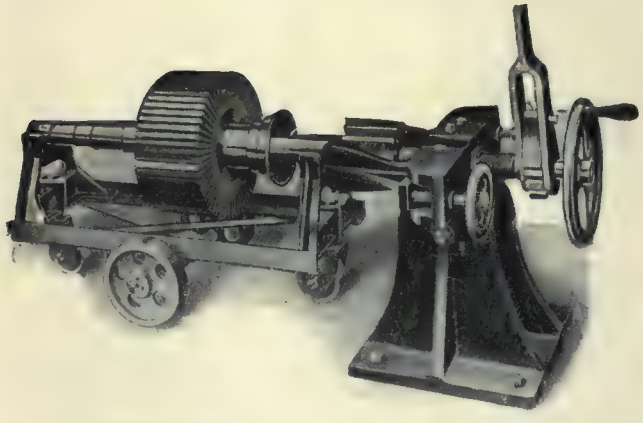
Car and Repair Shop EQUIPMENT



Columbia All-Steel Gear Case

We manufacture in our plant the following Electric Railway Equipment

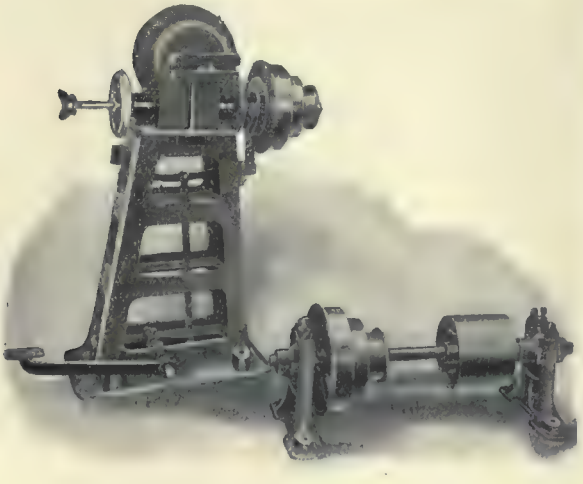
Controller Handles, Malleable Iron and all Steel Gear Cases, Coil Tapeing Machines, Pinion Pullers, Car Trimmings, Door Locks, Brake Appliances, Armature Stands, Field and Armature Coil Tension Stands, Coil Winding Machines, Signal or Target Switches, Rolls for Flattening Leads of Armature Coils, Brakes for Pony Trucks, Steel Trolley Poles, Trolley Wheels, Day and Night Car Signs, Armature and Axle Bearings, Field and Armature Coils, Commutators, Babbitting Moulds, Axle Straighteners.



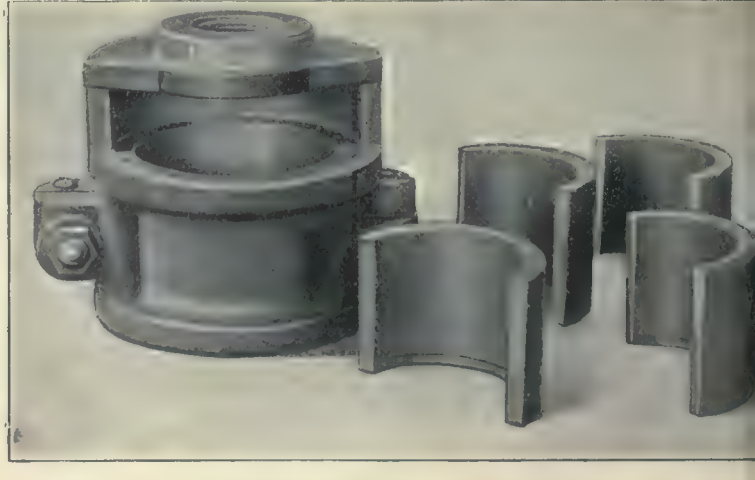
Columbia Pinion Puller and Armature Buggy



Columbia Armature Banding Machine



Columbia Field Coil Winding Machine



Columbia Boring Chuck for Motor Bearings

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

Weatherproof Tape

Insulating Compound



Baking Varnishes

Air-Drying Varnishes

Solid Compounds

For the prevention and cure of Insulation Troubles use

P & B Insulation

The right insulation in the right place is what you are after. We are prepared to *determine* the right insulation for your service as well as *supply* it. P. & B. Insulation has been standard with many large roads for thirty-one years.

We manufacture insulating varnishes, compounds and tapes for specific purposes. The following is a partial list:

CLEAR AND BLACK BAKING VARNISHES for armature and field coils, transformers and magnet coils, where high insulation is required.

BLACK AIR-DRYING VARNISH for quick repairs to dynamos, motors and taped connections, for feed wires, overhead and underground work, and for car motor leads.

BLACK FINISHING VARNISH, a quick-drying, absolutely oil-proof spirit varnish.

ELECTRICAL COMPOUNDS for switchboards, junction boxes, underground cables, etc.

P & B INSULATING TAPE, the most durable weather-proof tape made.

Write for Booklets

The Standard Paint Company

Woolworth Building, New York

Boston **Chicago**

You May Not be Able to Keep Your Armatures Out of the Wet, but You Can Keep the Wet Out of Your Armatures



Water Will Not Penetrate

ARMALAC

The Ideal Armature Insulation

Someone has said, "Trust in God, but keep your powder dry." Wise electric railway men say, "Trust your insulation, but keep your armatures dry."

Keeping the armatures out of the wet is not always practicable, but it's an easy proposition to keep the wet out of your armatures. Simply treat them with ARMALAC. An armature **Armalacked** is rendered **permanently impervious to moisture.** Water will not penetrate Armalac nor will any chemical action produce water from it. It is easy to apply and affords an ideal means of rejuvenating old armatures and making quick repairs inexpensively. Write for our interesting booklet: "How to Insulate an Armature."

Walpole Tire & Rubber Co.

Massachusetts Chemical Co.'s Products

Walpole, Mass.

Pioneers in Insulation Engineering

71551-P



We Can Save Money For You Too

Electric Railway Companies all over the United States and Canada send us their old field coils to be rebuilt and impregnated, because it means a substantial saving in cost over new coils, and because we do the job right and they know it.

The coils we return are absolutely perfect and "money back if they don't stand up" is the guarantee we give with each coil.

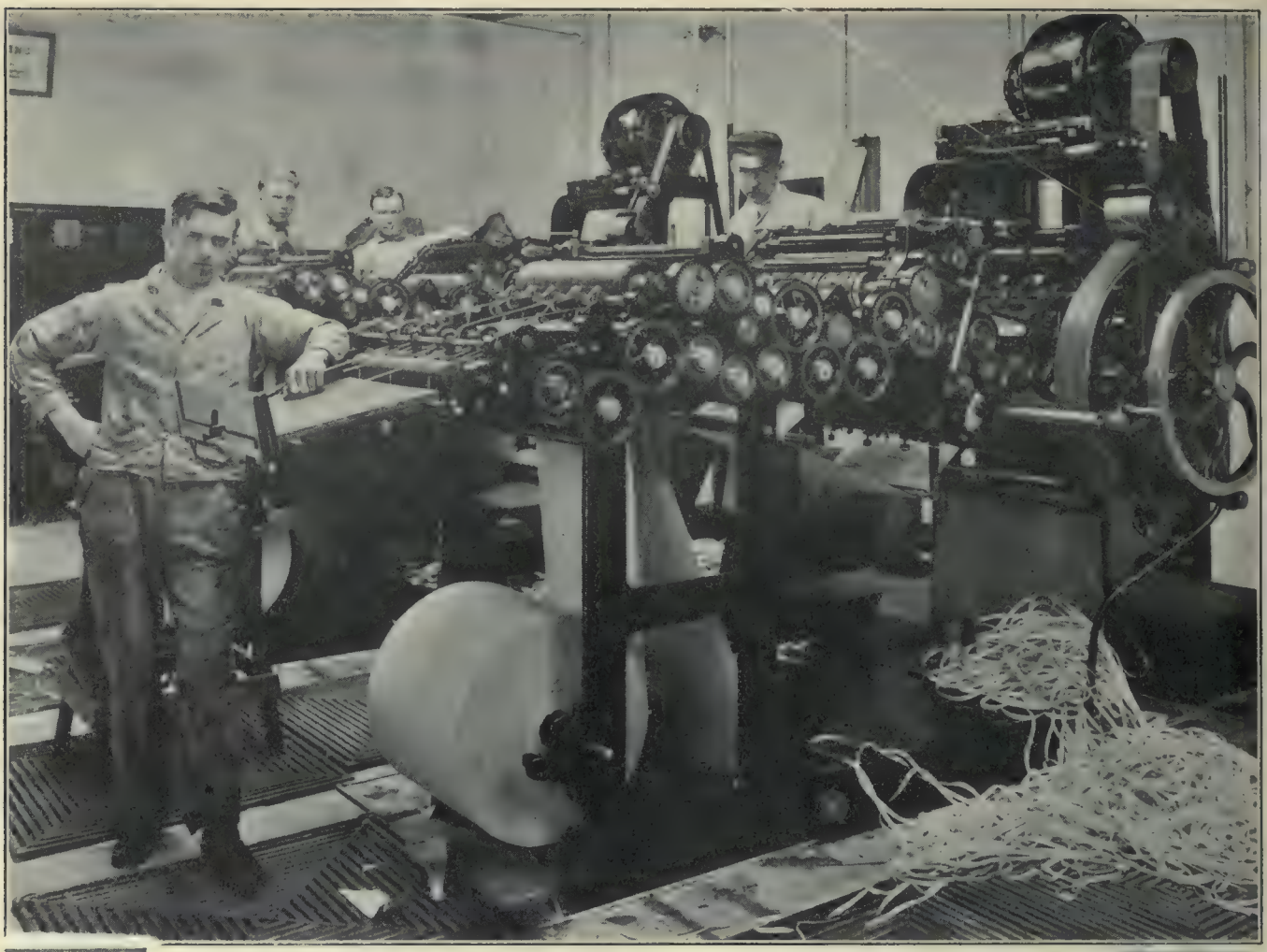
We have the plant, the men, the knoweldge and the experience to do the work right.

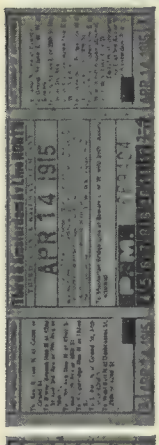
We solicit your work on the merit of our past performance.

Send us a few of your old coils, and be assured that while we are convincing you, you are saving money.

Electric Operations Co., Inc.

Bush Terminal, Brooklyn, N. Y.







Transfer Printing

262,500 transfers per hour or 2,100,000 per 8-hr. day

is an ordinary performance for a

Series V—Model 2 Meisel Rotary Transfer Ticket Press

In use by Third Avenue Ry. Co., N. Y., Los Angeles Ry. Corp., Los Angeles; Twin City Rapid Transit Co., Minneapolis; Spokane & Island Empire R. R. Co., Spokane.

Send This Coupon For Further Facts





Meisel Press Mfg. Co., Dorchester, Mass.
Please send me complete particulars of your Rotary Transfer Presses.
Name.....
Company.....
Address.....
E.R.J.-3-20-15

MEISEL PRESS MFG. CO.
DORCHESTER, MASS.

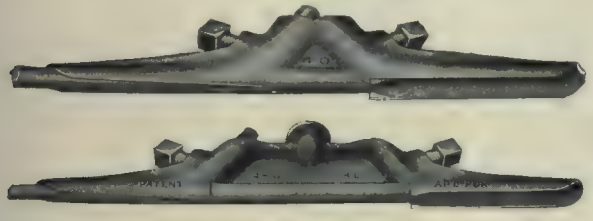
296

Drew Products

have contributed extensively to operating and maintenance economies. They have each been designed to solve special problems. Below are illustrated a few of the Drew Specialties which have made Drew Service noteworthy.

Others are:

Trolley Ears	Suspensions
Frogs	Hangers
Brackets	Insulators
Lightning Arresters	Pins, etc., etc.



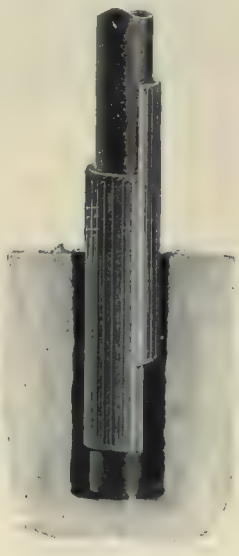
Sampson Splicers

have done away with arcing and have eliminated hammering of the trolley wheel under the splicer, thus insuring longer life to the splicer, trolley wheel and wire.



Drew Motorman's Mirror

reduces car step accidents by giving the motorman a view of the rear step or running board. It is a true Claim Reducer.



Drew Pole Sleeve

makes new poles of those that have weakened at ground line. Its use on new poles insures almost eternal life. A true Maintenance Saver.



Pipe Insulators

prevent electrolysis by keeping gas and water pipes and mains distinct units.

A Drew Offer $25 for a Suggestion

This amount will be paid to anyone who will suggest the best trade mark or trade design for use in our advertising and printed matter and on our electric railway and other products.

All answers will be judged by the officers of this company and must be at this office not later than April 15, 1915. In case of a tie, $25.00 will be awarded to each of those whose suggestions are found to be equally meritorious.

To get further particulars regarding the contest or the complete line of Drew products, send for catalog No. 3 J.



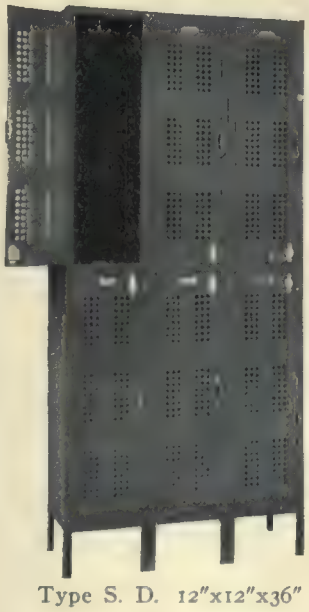
Free on request. It illustrates the complete Drew Line. **You** need it.

Drew Electric & Manufacturing Co.

814 Traction Bldg., Indianapolis, Ind.



DURAND STEEL RACKS



Type S. D. 12"x12"x36"

This steel rack contains no waste space, —does away with "lost material," delays in finding stock and delays in handling.

It's the perfect equipment for the modern railway shop.

DURAND STEEL LOCKERS

are manufactured in a variety of styles and sizes, for every equipment. Manufactured entirely of steel they are absolutely fire-proof, practically indestructible, clean, sanitary and convenient.

Yale locks insure the safety of the contents.

Write today for new rack and locker catalogues.

DURAND STEEL LOCKER COMPANY

Chicago
76 W. Monroe St.

New York
134 Nassau St.

From England—

All Communications to be Addressed to BROADWAY, BEXLEYHEATH.

URBAN DISTRICT COUNCIL OF BEXLEY.

Telegrams: Stokes, Tramways, Bexleyheath.
Telephone: 79 Bexleyheath.
(Manager's House 177).

H. P. STOKES, A.M.I.E.E., A.M.I.Mech.E.
Electrical Engineer
and Tramways Manager.

ELECTRICITY AND TRAMWAY OFFICES,
BROADWAY,
BEXLEYHEATH, KENT.

February 1st. 1915.

Messrs. The Pyrene Co. Ltd.,
19/21 Great Queen St.,
W.C.

Dear Sirs,

With reference to yours of the 27th. ult., I have to inform you that we have used your Pyrene Fire Extinguishers on three electrical fires with very great success.

One was a fire among the rubber cables of our old H. T. Switchboard, which would have led to disastrous results had it not been for the promptness with which your Fire Extinguisher was used.

The second instance, was on the occasion of a burn-out on a Traction Generator, and in this instance, the damage done to the machine was comparatively small on account of the efficiency of the Extinguisher.

The third instance, was the case of a burn-out on a single-phase alternator armature coil, which was put out within a few moments without finding it necessary to stop the machine, which is one coupled in tandem to the traction generator.

We have also used the Fire Extinguisher on other small outbreaks in the workshop and boiler-house, and I am perfectly satisfied with the success of same

I would specially emphasize that in no instance has any injury been caused to the electrical apparatus on which the fires have occurred.

Yours faithfully,

H. P. Stokes.

Pyrene TRADE MARK FIRE EXTINGUISHER



← Didn't even find it necessary to stop the machine.

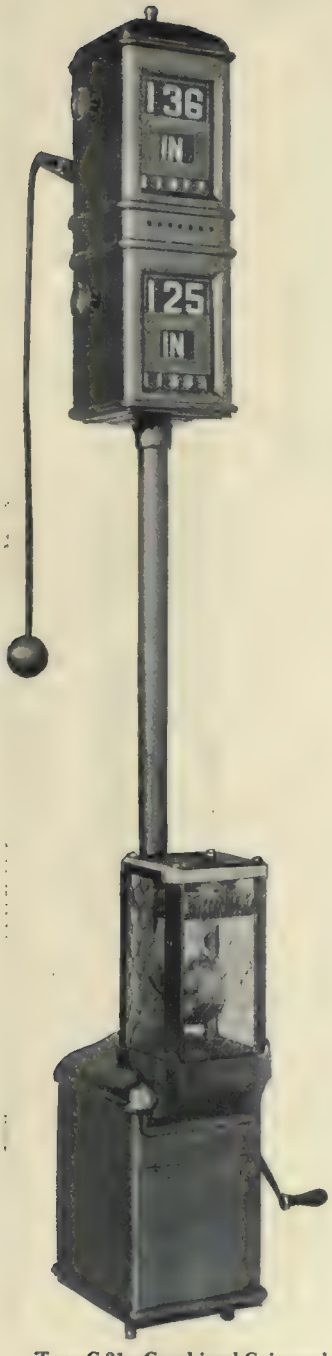
Write for special Electrical Booklet

PYRENE MANUFACTURING CO., 1358 Broadway, N. Y.

Offices in all large cities

DISTRIBUTORS TO ELECTRICAL TRADE: WESTERN ELECTRIC CO.
PACIFIC COAST DISTRIBUTORS: GORHAM FIRE APPARATUS CO., San Francisco, Los Angeles, Seattle
Distributors for Canada: May-Oatway Fire Alarms, Ltd., Winnipeg.
Distributors for Great Britain and the Continent: The Pyrene Co., Ltd., 19-21 Great Queen St., London, W. C.

International Coin Registers are Built to Suit Your Needs



Type C 21—Combined Coin and Transfer Register

Each city has its special conditions governing type of car and method of fare collection. One type of fare box cannot possibly serve equally well under a great variety of circumstances.

The International scheme of assembled units adapts itself to any requirements.

Two late types are shown here. Nothing experimental. Merely a new arrangement of mechanisms well seasoned by long service.

Coin and Transfer Register, Type C 21

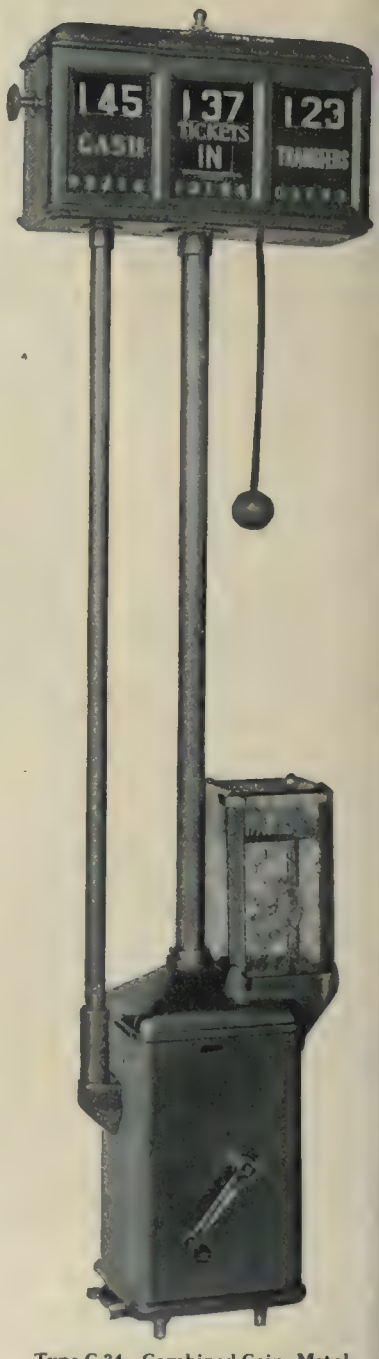
This is a standard International Coin Register with a second complete fare register added for registering Transfers or Tickets. The Transfer register is operated by pulling the cord. The coin register is operated automatically, by the money counter, when the crank is turned.

Coin, Metal Ticket and Transfer Register, Type C 24

This machine receives metal tickets and coins in the same hopper, counts the tickets on the center unit of the fare register, and the coins on the left hand unit, while the transfers are rung up by pulling the cord on the right hand side.

Metal Tickets have many advantages over paper tickets. They are harder to counterfeit, as very expensive and powerful coining presses are required, such as are found in very few private shops, while anybody has access to a printing press.

Cost of paper and printing eliminated. If made attractive in design, they will be carried away as souvenirs and the cost being a small fraction of the face value, the profit from this source should easily cover wear and tear.



Type C 24—Combined Coin, Metal Ticket and Transfer Register

All substitution of tickets for money in returns are prevented with the use of the machine, as the tickets are automatically counted separately. All mistakes in ringing up fares are eliminated.

MANY OTHER TYPES are ready for inspection and trial. Should none of these meet your conditions, we can quickly solve your problem and submit a sample. The C24 was designed and built in one week.

Tell us what you want and we will build it.

The International Register Company

15 South Throop Street, Chicago, Ill.

The Three Big Dayton Leaders

NO. 1



Dayton Computing Fare Recorders for City, Suburban and Interurban Service.
Made in the following standard sizes:
4-fare, 6-fare, 8-fare, 10-fare, 12-fare, 15-fare, 18-fare, 20-fare and 24-fare.



All Dayton Recorders are guaranteed *right* in design and construction.

The double-dial fare indicators are a valuable feature, as they constantly attract attention when fares are being registered, making both public and private inspection easy and effective.
By the Dayton System every fare is indicated as paid, is registered and recorded as indicated and is as effectually checked and verified by the double system of recording as money paid in bank.

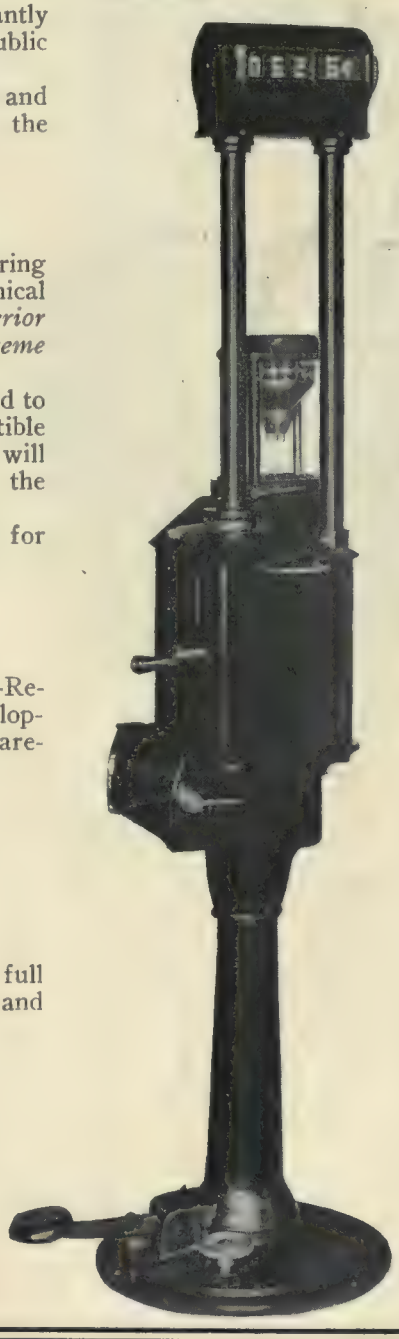


NO. 2

The Dayton standard DB registering Fare Box is a masterpiece of mechanical construction—*right* in design—*superior* in material and construction—*supreme* in service.
Every Dayton Fare Box is guaranteed to be practically infallible and indestructible under normal conditions of use and will give years and years of service at the very minimum of maintenance cost.
Ask us to send you a sample box for your examination and trial.

NO. 3

The Dayton Combination Fare Box-Recorder is the full and logical development of the fare box method of fare-getting and fare handling.



ADVANTAGES:
All cash fares registered through the fare box.
All fares indicated and registered.
Indisputable records obtained of the fare collections.
No figure drudgery.
No arguments in settlement.
No money-losing errors in trip sheet footings and extensions—but full collections, full settlements, and a *square deal* for both company and employees.

Write today for information regarding the type of fare register equipment in which you are interested.

The Dayton Fare Recorder Company

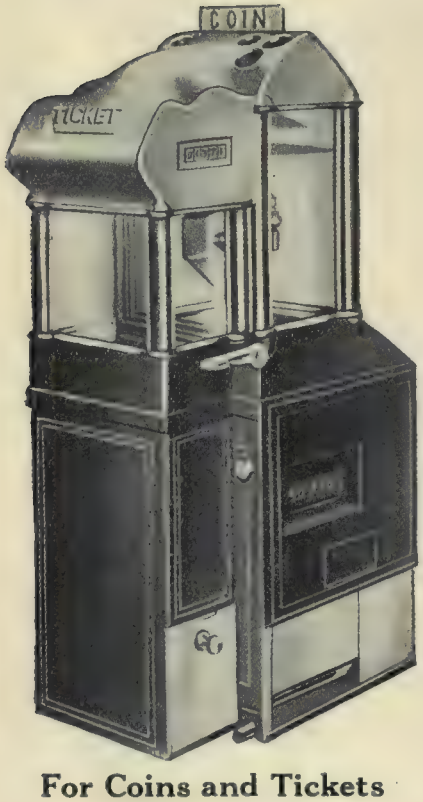
Dayton, Ohio

What Greater

Fare Box cou

than the

The JOHNSON R



For Coins and Tickets

has proven its ability absolutely beyond the slightest possibility of challenge or doubt to meet *any* and *every* fare-collection requirement.

Get All the Fares

On big roads—on small roads—where the traffic is heavy—where the traffic is light—during ordinary service conditions—during rush-hours, IT HAS DEMONSTRATED ITS PRACTICAL UTILITY AS A MEANS OF FARE COLLECTION WHICH GETS ALL THE FARES.

6000 in Service

Not fifty or a hundred or five hundred or a thousand, but *more than* 6,000 of these boxes in use throughout the country afford you ample evidence of the fact that the Johnson Registering Fare Box has "arrived."

Used by 60 Important Roads

Its adoption and use by *sixty important railways* throughout the United States and only the highest praise for the machine's accuracy, its durability and the manner in which it increases fare receipts, would certainly indicate that the Johnson Fare Box has long since gone beyond the experimental stage.

The Blunt Facts Demanded

TODAY, IT IS NOT A QUESTION OF THEORIES OR CLAIMS—BUT RATHER OF "Where is your machine installed? What is it doing? What is its record? How does it stand up in service? What is its maintenance cost? What will it mean to our road in dollars and cents if we put it on our cars?"

The Answer

And what kind of an answer do you think the Johnson Registering Fare Box justifies and earns to those questions when roads like the Public Service Corporation of New Jersey order and reorder 1400 of these boxes—like the Third Avenue Railway of New York, 1000—like the Stone & Webster Properties, 1000—like the Omaha & Council Bluffs Street Railway—United Railroads of San Francisco—San Francisco-Oakland Terminal Railways, and many others of equal prominence which equip their cars with the Johnson Box?

Roads Like These Use the Johnson Fare Box

Stone & Webster Properties
Public Service Corporation of N. J.
Third Avenue Railway Co., New York
Union Railway Co., New York.
New York Railways Co., New York
United Railways & Electric Co., Baltimore.
Grand Rapids Railway Co., Grand Rapids
Omaha & Council Bluffs St. Ry. Co.
Elmira Water, Light & R.R. Co., Elmira, N. Y.
United Railroads of San Francisco, Calif.
San Francisco-Oakland Terminal Rys., Oakland, Cal.
Mobile Light & Railroad Co., Mobile, Alabama.
Municipal Railways of San Francisco, Calif.
Cedar Rapids & Marion City Ry. Co., Cedar Rapids, Ia.
Union Electric Co., Dubuque, Iowa.
Public Utilities Co., Evansville, Ind.

Write us Stating Number of Cars Y
will Suggest How to Meet Th

JOHNSON FAR

Robey St. & Jack

30 Church

ndorsement of a

d you require

se Facts:

istering Fare Box

NOW WHY?

2 to 15% Increase in Earnings

Primarily, because the Johnson Registering Fare Box increases the revenue of an electric railway 2 to 15% and tremendously speeds up the collection of fares, making a most remarkable improvement in schedules during rush hours.

Millions Lost Annually

Millions of dollars are lost annually in missed fares. The Johnson Registering Fare Box will save *YOUR* Road its proportion of that loss. It revolutionizes business methods as far as fare collections are concerned. It does away with the old-fashioned "wooden till" method and applies in its stead the "cash register" principle to street railway operation.

No Chance of Error

It positively eliminates all errors in fare—collection—no matter how or where incurred and assures full and complete fare collection.

Solves Ticket Problem

The Johnson Registering Fare Box not only provides fully for cash fares but it also *solves the ticket problem*, and even goes a step further by seizing the tickets from the passenger's hand, *cancelling the ticket and registering it.*

Satisfies U. S. Government

The coin-counting mechanism is the same as in the Johnson Coin Counter which is employed by the *United States Government* and in use in all *prominent banks*—so there can be no room for doubt as to the *accuracy* of this machine.

Maintenance Is Negligible

As to its *maintenance, that is practically nil* and we can very quickly satisfy you on that point as well as on every other claim we have made, by the most *convincing indorsements* by some of the biggest, most important and most exacting electric railways on this Continent.

If you are *willing* to be convinced we can *certainly* convince you.

rate and Your Conditions and we Advise as to the Cost

OX COMPANY

ulevard, CHICAGO

W YORK



For Coins Only

The Johnson Fare Box INCREASED THE EARNINGS of The Third Ave. Ry. $194,000 in One Year.

IT ADDS 2 to 15% to Fare Receipts!

Car Equipment *vs.* Man Equipment In Fare Collection





When buying fare registers or fare boxes the idea instinctively comes to the railway man that he is buying something *to go along with the car—car equipment.*

Unfortunately for him, that is just what he *is* buying — and being purely car equipment the efficiency varies as car *types* vary.

The old clock register and fare box have many vital defects due to their dependence upon variable factors. They are lame because *the car itself does not provide for certain things,* and these registers or boxes are *dependent upon car arrangement.* The fare box is a go-along-with-the-car proposition. For increased receipts through its use you look largely to the type of car rather than to any increased get-together efficiency in the relationships of passenger, conductor or company.

The ROOKE SYSTEM principle and register is the mechanically expressed result of the idea that if you are ever to get maximum receipts, protect your conductors and secure the proper co-operation of your passengers when paying their fares—if you are ever to get these things, the register used must be *a part of the conductor, a part of the passenger,* and *a part of the company. These three factors must get together the instant of payment. Their interests, attention and physical moves, the instant of fare payment, must be absolutely conjoined.*

The ROOKE register is not car equipment. *It is fare collecting service.* The register goes along with the conductor, becomes a handy feature of personal convenience, is both a *spur to secure his best efforts and a check positively deterring him from error.*

It is greatly to your advantage that the ROOKE register operates this way. When the conductor takes his car he signs for and takes his register, and there is no possible dispute regarding readings or complications with other conductors. When he leaves the car the register goes along with him just the same as a valuable watch in his pocket. His record is never locked up in the car, mixed with other conductor's records, or subjected to auditing delays. In making his turn-in the register goes along with his report and can flexibly convenience the auditor. When it is necessary to go into the car to collect fares (and such things are necessary even on prepayment cars) the fare collecting system goes right along with him. *The passenger always pays the same way.* The register *always goes to the passenger.* The transaction is always on the basis of *passenger* (1st), *to company* (2d), *to conductor* (3d). This applies to all types of cars. It brings to you one standard, uniform system for *all* your cars—prepayment and otherwise.

On the prepayment platform the ROOKE register, in the conductor's hand, is within the reach of every passenger on the rear platform. The passenger cannot hang back or take advantage. The conductor is not cooling his eye on some box, hampered in his movements and forced to go slow through the slow movement of passengers who may be attempting to "put something over" on the mute fare box. The conductor conveniences passengers, speeds up loading time. He *goes after* fares. His collecting instinct is utilized and developed — not killed, as with the box. Each transaction on the car means that the passenger and the conductor are forced to give the instant of attention necessary so that all parties *see* the register, *feel the action* of the register, *hear the bell* of the register, and instinctively *know* that the fare is registered properly.

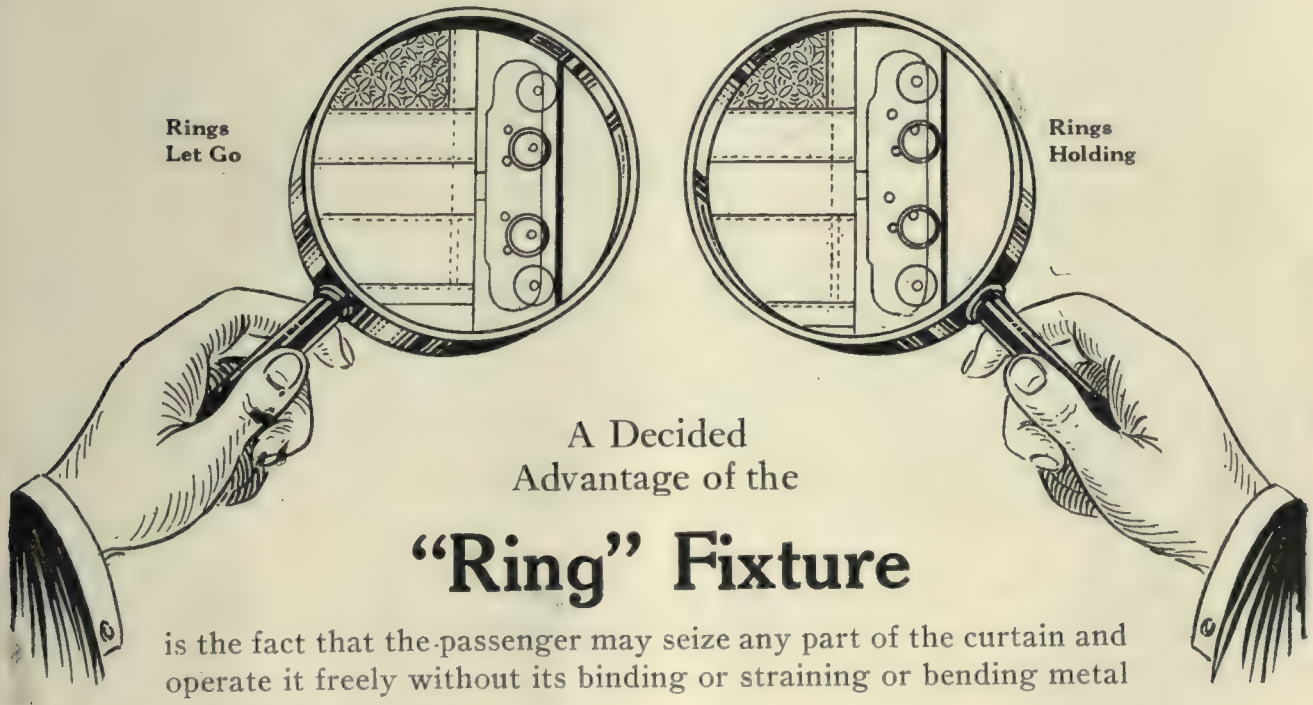
The ROOKE SYSTEM is the only real, get-together system possible for you.

ROOKE AUTOMATIC REGISTER COMPANY

PROVIDENCE, RHODE ISLAND

Educating Passengers to Operate the Pinch Handles of a Car Curtain Costs a Lot of Money!

No "Education" is necessary when *This* Car Curtain is used



A Decided Advantage of the

"Ring" Fixture

is the fact that the passenger may seize any part of the curtain and operate it freely without its binding or straining or bending metal or fabric.

And yet the curtain holds fast in any set position.

It is all due to the automatic "Hold" and "Let go" action of the rings (see illustration).

Another very important feature:

The Ring Fixture has a locking adjustment.

This is in the form of a pin and socket on the knurled end of the spring chamber, holding the tips in proper adjustment.

83% of All the Cars Purchased by Electric Railways in 1914 were Equipped with the Ring Fixture!

Write for Bulletin "C-3"

The Curtain Supply Co., 322 West Ohio St., Chicago
48 Church Street, New York

NEW DISCOVERIES

Everybody Threatened by the GERMS That PLAGUED JOB

By L. K. HIRSHBERG.
A.B., M.A., M.D. (Johns Hopkins).

BOILS receive their name because it used to be believed that they were due to the blood's becoming too hot and boiling over in different parts of the body. Until very recently most persons who had boils would go to a druggist or to a doctor [illegible]

We Can "Catch" Boils E[illegible]



A FEW OF THE W[illegible]

From Left to Right—Straps in Street Cars, Linen C[illegible] in the Barber Shops, a Friend[illegible] At the [illegible] of other [illegible]

Adopt these snow-white, non-absorbent
RICO Sanitary Strap Covers.

The public is awakening to the dangers of uncovered leather-straps. They will appreciate
RICO covers.

Roads to the number of 300 have adopted them. You can utilize your old straps.

Write for our booklet, "The Car Beautiful."

Railway Improvement Co.
61 Broadway, New York







RICO
Sanitary
Strap Covers

41378-P



"RICO"

Coasting Recorders

Reduce Power Consumption

Improve Schedules.

Reduce Accidents.

Reduce Maintenance Expense.

You can buy them out of the savings effected.

Over 6000 cars equipped.

It's a luxuury to operate your cars without Coasting Recorders.

Railway Improvement Co.

61 Broadway, New York

Chicago Los Angeles London



Extract from article describing New Orleans Cars. Electric Railway Journal, Feb. 6, 1915.
"Altogether, the design constitutes an excellent example of the most modern developments in surface car construction."

Interior view of new cars for New Orleans Ry. and Light Co. Agasote Headlining and Pantasote Curtains.

The Pantasote Company
New York
Chicago San Francisco Montreal

Take Thought About the Top of Your Car When Considering 1915 Economies



And Join the Army of
BAYONNE CAR ROOFING USERS

The BAYONNE specially prepared canvas has been proved beyond all doubt to be the best weather resisting roof material which has entered into car construction.

Unlike ordinary fabric roofing, BAYONNE CAR ROOFING *WEARS*. Its ingredients embody the best chemical and mechanical thought in dealing with destructive weather conditions. The many electric and steam roads which are its users since it first came on the market eight years ago have never added new cars without specifying BAYONNE CAR ROOFING. It increases the life of the car. And we have added a new word to car use—"Car-Roof-Mileage."

We would earnestly advise you to pare down roof maintenance cost with

BAYONNE CAR ROOFING

26″ to 120″ wide

We would like to send you our literature on "car head-gear."

JOHN BOYLE & CO., INC.

112-114 Duane Street New York City 70-72 Reade Street

Branch House, 202-204 Market St., St. Louis, Mo.

Wide Cotton Duck

Largest Stock and assortment in United States
Also headquarters for Cheesecloth and Bunting

Suppose you had a man on every one of your cars doing THIS



twenty-four hours a day.

Suppose each man's duty was to save heating current now going to waste.

Suppose each had to constantly watch the thermometer.

Whenever the temperature rose above the arbitrary "point," he must cut off the heating current.



You know that this would occur many times a day and the aggregate saving in a year on all your cars would be ENORMOUS.

And you know also that such a task would be well-nigh impossible of accomplishment by any ordinary man and utterly out of the question from a practical standpoint.

But do you realize that there is an actual and remarkably effective method of accomplishing these savings, in

The UTILITY Electric Thermometer Control

And it is a method that is free from the "man factor"—a method that, once installed, works AUTOMATICALLY, hour after hour, day and night, week in and week out, year after year, without ever shirking, without complaint, without pay and WITHOUT FAILING to fulfill its function—*the saving of your current.*

Here's what it means to you: The desired temperature in your cars automatically maintained at all times with a minimum consumption of current.

Utilization of the heat radiated from the passengers' bodies in a well-filled car, with a corresponding saving of heating current.

A greatly reduced heating load at the very time when the power load is greatest.

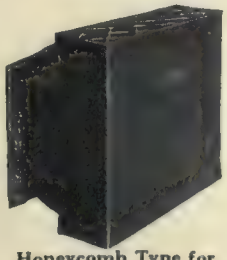
Let us explain the advantages of this method more in detail and show you its superiority over any other device on the market.

Remember, we sell it with an iron-clad guarantee. *Investigate it.* Ask for catalog 400.

Successful Car Ventilation Is Not Simply a Question of Buying Ventilators and Installing Them

UTILITY Car Ventilators

Are Made in Different Types to Meet Widely Varying Conditions



Honeycomb Type for Side Deck

It is an engineering problem which must be met scientifically with the type of ventilator and the number of ventilators best adapted to the work to be performed.

Through constant study of the field, our engineers can tell you the type best suited to meet your particular ventilating conditions.

Put your problem up to us.

Utility Ventilators are economical in first cost, simple and rugged in construction, light in weight, easily and cheaply applied, durable, waterproof, weather proof, dust, dirt and cinder-proof. They exhaust the air efficiently whether the car is running or standing still.

Charts and full technical data sent to any road interested, on request.



Round "Jet" Type (Patented)

Railway Utility Company

General Offices
721 West Fulton St., Chicago

Eastern Office
1328 Broadway, New York

The Bluff Called!



Can You Beat It?

New Orleans Pressed Steel Car, Lightest fifty-two Passenger City Car on record.

Southern Car Co.
High Point, N. C.

Watch Your Step!

No matter what the weather
guarantee your passengers

SAFE FOOTING

The Stanwood Car Step

with its high carbon steel treads which are arranged to be self-cleaning, makes entrance to the car and departure from it safe. Its reputation is world-wide. Made in single, double, triple and folding types. It can be furnished with various types of hangers to fit any make of car—new or old.



The most costly thing in equipment is not first cost—but after-maintenance. Cost of accidents to passengers should be listed under this head.



Mason Safety Tread on Curved Step of Trolley Car.

The Mason Safety Tread

is necessary wherever walking in a vehicle is dangerous because of motion or weather conditions. Every condition under foot is provided for by the Mason Safety Tread—aisles, station-platforms, vestibules, running boards, steps, etc. The tread can be put on any material. It is ideal in resisting wear, and is made with either lead or carborundum filled grooves.

Complete Information on Request

American Mason Safety Tread Co.

Main Offices, Lowell, Mass.

Branch Offices: Boston, New York, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

There can be No Half-Way Measures in Life-Saving



From the Public Service Safety Campaign

Hence the Wide Adoption of

Providence Fenders

and

H-B Life-Guards



From the Chicago Safety Campaign

The Consolidated Car Fender Co.
Providence, R. I.

Wendell & MacDuffie Co.
61 Broadway
General Sales Agents

2157



Golden Glow replaced 4 ampere arc and incandescent headlights at Omaha after thorough competitive test.

OMAHA & COUNCIL BLUFFS STREET RAILWAY CO.
OMAHA, February 2, 1915.

BROWN & HALL, St. Louis, Mo.
Gentlemen:

I feel that some explanation is due regarding this photograph.

You will note that this picture shows the Golden Glow headlight and also the ordinary dash type incandescent headlight below. You will recall that we formerly used arc headlights in the outlying districts and the incandescent light when in town.

We replaced the arc light with the Golden Glow and use it exclusively on these cars, the semaphore lens lamp not being used at any time.

The latter was set in the dash and as we have not needed them elsewhere and the cars have not been overhauled, the lower light has been left in the car dash up to this time.

Yours very truly,
(Signed) F. S. WELTY,
Purchasing Agent.

Golden Glow Headlights Are Winning in Every Test

Because

They Give More Light than an arc or any other incandescent headlight. This is easily proven. You can actually see further down the track, pick out switch points, distinguish passengers in easy stopping distance.

They Provide a Different Quality of Light —a soft golden beam which will not dazzle or blind those approaching. It will penetrate fog and rain far better than a white light. On city streets where lights are numerous the beams from the "Golden Glow" blend with the general illumination. In dark sections "Golden Glow" gives a result which cannot be secured with any other headlight.

They Decrease Expense of front-end illumination. The average arc light costs $75 to $80 per year for current and maintenance. It consumes from 2½ to 5 amperes, 1.4 to 3 K.W., a very considerable amount. "Golden Glow" uses between 23 and 150 watts, depending upon the type and service. There is no maintenance to the "Golden Glow" mirrored glass reflector, nothing to wear out, and replacements are limited to the renewal of incandescent bulbs.

They Increase Efficiency. Your motorman always has an operating light, a light which is always on the right of way, never flickers nor kicks out. There has never been an accident to a car so equipped because of lack of light.

Let us Make a Trial for You

Scores of operating officials all over the country have accepted our offer to make an actual service demonstration of "Golden Glow" headlights. We leave the lamps on the car for a month or two, subject to their most severe conditions.

We will be glad to do this for you. Either write the factory direct or our nearest office.

E. R. Mason Co., 2038 Grand Central Term., New York.
The Walker-Smith Co., Knickerbocker Bldg., Baltimore.
The C. E. A. Carr Co., 2 Toronto Street, Toronto, Canada.
J. B. Sebring Co., Baum and Euclid Streets, Pittsburgh.
L. L. Parkinson, 634 Cass Avenue, Detroit.
C. F. Saenger & Co., Electric Building, Cleveland.
R. R. Holden, 320 New York Life Building, Chicago.
Grayson Railway Supply Co., LaSalle Building, St. Louis.
Brown & Hall Supply Co., 620 Central National Bank Building, St. Louis.
Railroad Signal Supply Co., Hackney Building, St. Paul.
Alfred Connor, Majestic Building, Denver.
F. C. Morton, Walker Bank Building, Salt Lake City.
G. L. Priest, 229 Sherlock Building, Portland, Oregon.
F. F. Bodler, 901 Monadnock Building, San Francisco.
S. I. Wailes, Trust and Savings Building, Los Angeles.
Giovanni Chechetti, Milan, Italy.
Ammann & Co., Zurich, Switzerland.
Forest City Electric Services Supply Co., Salford, England.

The ESTERLINE Co.

219 East South Street, Indianapolis, Indiana

SERVICE

The service you get *out* of your bushings depends entirely upon what the manufacturers put *into* them.

Recently a "Bound Brook" Bushing was removed from a four-inch trolley wheel after having run

27,633 Miles

The wheel was worn out, *but the bushing showed little evidence of wear.*

With such evidence as this, and knowing the fact that



Over a Million

"Bound Brook" Bushings were sold last year, you should buy *only* the Genuine Bound Brook Bushing, packed fifty to the box, with the green label.

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the U. S. A. by the

Graphite Lubricating Company



33⅓% Reduction

in trolley maintenance expense is the usual record of railway companies after standardizing on BAYONET TIME-SAVING TROLLEY EQUIPMENT. The saving in trolley wheels alone usually pays for the harps and their maintenance.

Bayonet Special Trolley Wheels

increase this saving if used in Bayonet Detachable Harps, because they are made of superior quality of metal with accurate balance and finish. The quick and easy method of changing the harp head and wheel insures proper inspection, lubrication and adjustments, all of which is very essential in keeping your trolleys in perfect running condition at all times.



75 Styles, Sizes or Combinations of Harps

to select from. Detachable Harps—changed in TEN SECONDS—for Interurban, City and Industrial Cars, surpass all others for economy and efficiency. Non-detachable Harps, ranking next to our Detachable Harp for efficiency, for those who want THE BEST FOR THE LEAST MONEY. No harp is so well made. Smooth, symmetrical, light.

We will eliminate your trolley wheel bearing troubles and expense, if you will use either our No. 57 or 67 Harp and our No. 18 or 19 Wheel, which are provided with our famous self-lubricating bearings that never wear out. A 4000-mile test on high-speed showed no wear in the bearing of a No. 19 wheel. The groove will run several thousand miles more. Let us tell you why.



Bayonet High Speed Trolley Bases

are built to stand the severest service. Made largely of steel, renewable bushings in all bearings, highest grade springs, anti-friction tension, POLES CHANGED IN ONE MINUTE and wheels perfectly aligned with wire. It is THE WEAR-EVER BASE WITH THE TIME-SAVING FEATURES THROWN IN. No delays to cars. No interruption to train schedules on account of damaged trolleys. Its interchangeable wearing parts make it the cheapest to maintain.



Bayonet Equipment Sells on Its Merits

SOLD ON 90 DAYS' APPROVAL. IF NOT SATISFIED THAT IT IS THE BEST YOU EVER USED, SEND IT BACK AT OUR EXPENSE.

Will you take advantage of this golden opportunity to learn why it is economy to use Bayonet Time-Saving Trolley Equipment on your cars? Write us for further particulars.

Bayonet Trolley Harp Co., Springfield, Ohio

Wm. R. Garton, Sales Engineer, 299 Broadway, New York City, N. Y.
John S. Black Co., Sales Agents, 908 Hennen Bldg., New Orleans, La.
Satterlee Elec. Co., Hall Bldg., 9th and Walnut Sts., Kansas City, Mo.



This Wheel

needs No Lubricating



Think what this means.

Once installed, it requires no attention—saves lubricant and labor—does away with the destructive effects of dripping oil and the constant wear and tear on roofing caused by shopmen. The

V-K

OILLESS TROLLEY WHEEL

is effectively and continuously self-lubricating without any of the drawbacks that limit the practical value of other self-lubricating types.

Because the "V-K" has no oil or grease chamber around the bearing acting as an insulator to destroy or diminish perfect conductivity. It is made with a patented graphite and gauze bushing thoroughly impregnated with graphite lubricant—non-insulating—heat-proof—long-lived—easily interchangeable.

The "V-K" wheel is made of specially tough metal—not hard—is properly balanced—mechanically perfect in finish—gives greater mileage with least detriment to overhead wiring.

For best results, use the "V-K" OILLESS TROLLEY WHEEL with the

"V-K" NON-ARCING HARP

The harp with the patented gripping device for locking the axle-pin in its socket. Gives the best form of contact yet obtained in any type of harp—ensures freedom from interruption of current—prolongs life of wheel and harp together.

Any fair trial of the "V-K" equipment will convince you of the wisdom of adopting them as standard. Look into this further—write us for particulars.

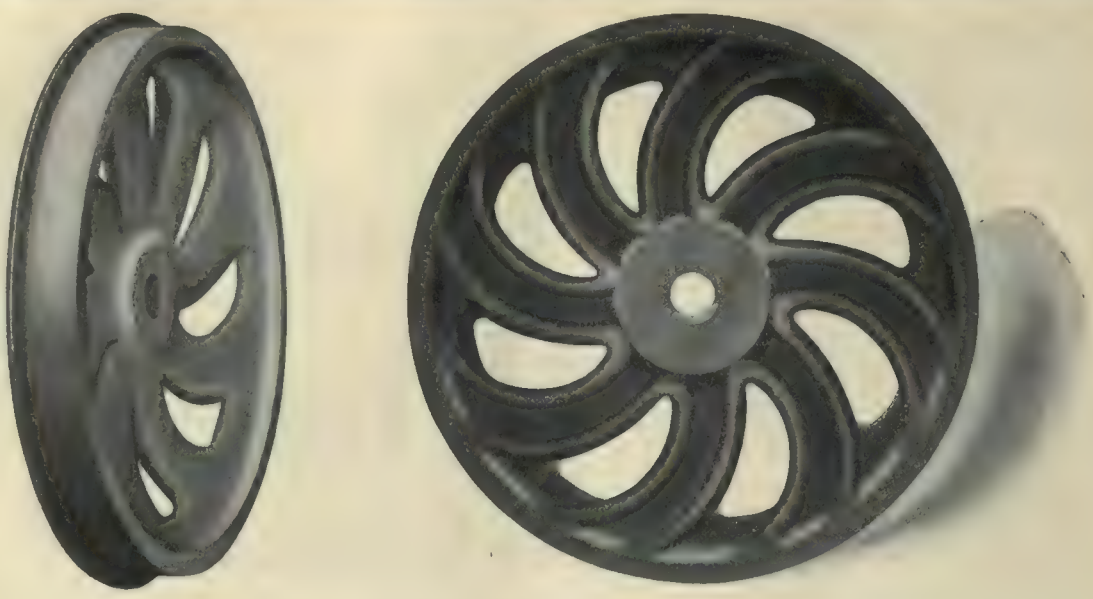
Send for our new illustrated Catalog now on the press. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

MORE-JONES BRASS & METAL CO.

ST. LOUIS, MO.

Manufacturers of

Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal, and similar products.



The Wonderful Single Service Chilled Iron Car Wheel

In One Hundred Cities of the United States and Canada 90 per cent. of the Street Car Companies operating 100 cars or over use Chilled Iron Car Wheels.

Occasionally a Street Car Company will experiment with other types, but in most cases return to the Chilled Iron Wheel. This does not just happen —it is a lesson forced by experience.

Chilled Iron Wheels, unlike other types, act in harmony with the parts with which they come in contact such as brake shoe and rail.

Comparative tests in some cases show the consumption of brake shoes 25% to 50% greater with other types than with Chilled Iron Wheels. When this loss is considered and when we reckon on an additional loss in rail wear and power consumption of at least 10%, the reason why Chilled Iron Street Car Wheels are used in such a diversified territory is apparent.

The Wonderful Single Service Chilled Iron Car Wheel

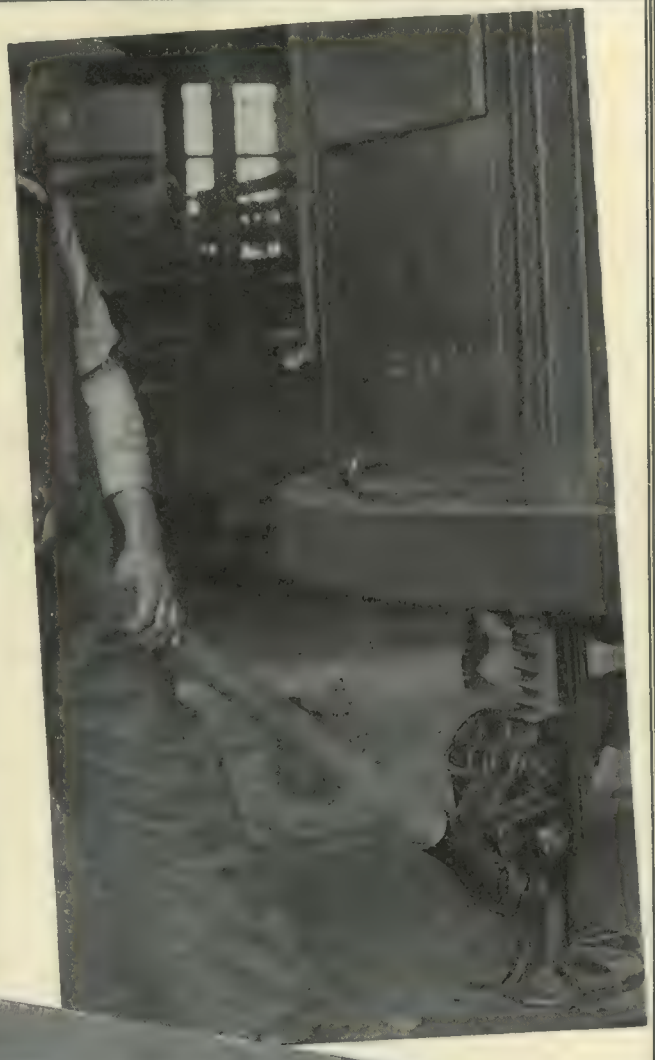
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

1214 McCormick Building, Chicago

Representing forty-eight wheel foundries throughout the United States and Canada.
Capacity 20,000 Chilled Iron Wheels per day.

More than three dozen electric roads, operating nearly ten thousand cars have, within the past three years, equipped every car on their systems with

BARRETT
Emergency
CAR JACKS



In every important case on record, the railway companies have benefited greatly by the presence of the emergency jack for promptly relieving tie-ups, as well as for rescue work before the arrival of an emergency wagon in cases of serious accidents.

The Barrett Emergency Car jack is a powerful aid in minimizing losses through unavoidable accidents and tie-ups; it effects substantial savings of time and money.

No. 239 "Bay State" 15-ton jack with swivel claw is shown in middle picture lifting a car back on the track.

No. 439 "Senter" 20-ton geared jack was recently adopted by the Philadelphia Rapid Transit Co. for all their cars. Note the quickly adjustable swivel claw in lower photo. These are our two most recent models.

We offer the services of our engineering department in designing special jacks for cars of special construction, where none of our standard designs will fill requirements.





The Duff Mfg. Co.
Established 1883
PITTSBURGH, PA.
50 Church St., New York
Peoples Gas Bldg., Chicago
Candler Bldg., Atlanta

Send for complete Catalog No. 102 of:

Barrett Track and Car Jacks
Duff Ball Bearing Screw Jacks
Armature Motor Lifts or Pit Jacks

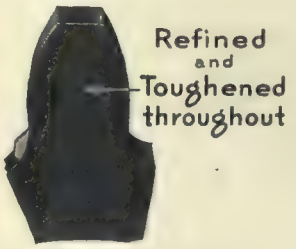
Insure Minimum Operating Cost by using "V D & D" Gears and Pinions



Grade HARDENED

Maximum Wear and **Strength** are secured by our special process of hardening. The wearing surface is converted into **Tool Steel** (wear), and the core materially toughened (strength).

Use our grade HARDENED for lowest cost per car mile.



Grade TREATED

Greath Strength and **Long Service** are outstanding features of our Grade TREATED. Our special process of heat treatment refines and toughens the steel throughout, reducing breakage to a minimum.

Use our Grade TREATED for extra Heavy Duty Service.

Write for our Pamphlet
A feature of lowest operating and maintenance cost

THE VAN DORN & DUTTON COMPANY

Gear Specialists

CLEVELAND, O., U. S. A.

NEW YORK SAN FRANCISCO

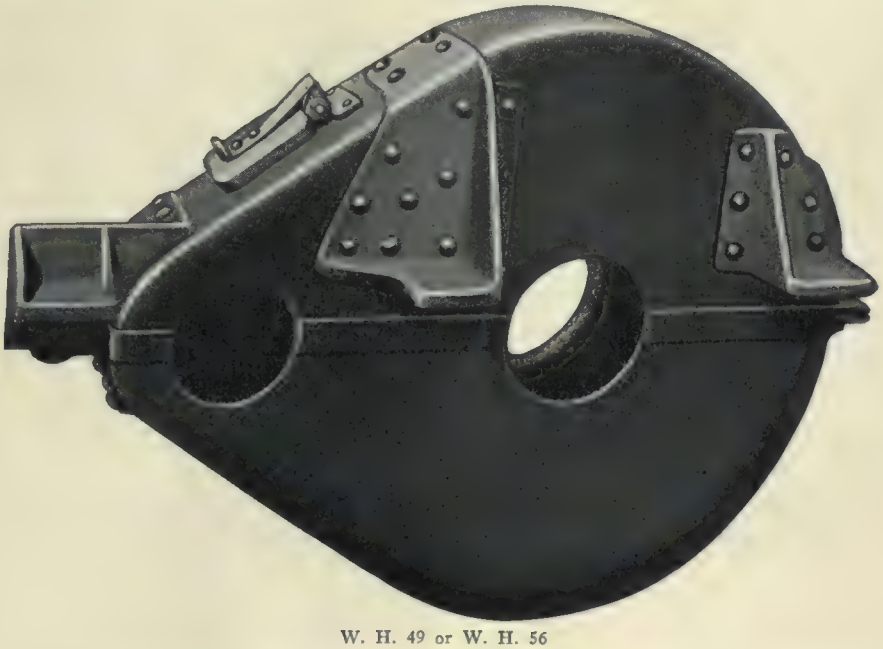
C. E. A. Carr, Special Canadian Representative, 2 Toronto St., Toronto, Canada

Many railway men have admitted to us that particularly on low hung motors they are experiencing numerous gear case failures due entirely to bumping them over their special track work, etc.

Have you ever considered the importance this condition plays in running up your maintenance cost, and have you ever investigated whether or not the distance between your pavement and gear cases could be increased?

You can obtain Maximum Clearance with

Chillingworth Shallow Bottom Halves



W. H. 49 or W. H. 56

Are the Brackets you use designed and constructed to resist hard service, and will they compare with those illustrated above?

If you use Riveted Up Cases you already appreciate the value of the fact that there are no seams to open up on Chillingworth Cases.

If you are having Gear Case Troubles and are interested in solving them why don't you order about one dozen Chillingworth Cases and place them in service alongside of any other type of case and keep a comparative record of the results obtained, and award your business to the case that gives the most satisfaction with the least expenditure of money?

Thayer & Company, Inc., Agents

111 Broadway, New York City

REPRESENTATIVES:

U. S. Metal and Mfg. Co., Southern and New England States
Allen General Supplies, Canada.
H. F. Keegan & Company, Chicago.
Grayson Railway Supply Co., St. Louis.
W. R. Garton Company, Chicago.
Union Electric Company, Pittsburgh.



Philip Nungesser

We Proved It

In the comparatively short time that Nungesser Carbon and Metal Brushes have been on the market, we have secured as regular customers leading firms in all lines of industry using carbon products as follows—

Street Railways
Steam Railways
Steel Mills
Electric Crane Manufacturers
Electric Signal Manufacturers
Automobile Starter and Lighter Manufacturers
Central Stations
Dynamo and Motor Manufacturers
Circuit Breaker Manufacturers
Railway Car Lighting Manufacturers
Electric Drill Manufacturers and Others

In each case we were obliged **to prove** that Nungesser brushes would give the customer "Better service than he had been receiving before."

If Such Service Interests You—Say the Word

The Nungesser Carbon & Battery Co.

Cleveland, Ohio


There is always one stately Tree that stands forth above all others, its great, arching limbs telling a story of steady growth through the years, of the weathering of many a storm, and of the mighty strength that is stored up to resist the slow wear of the centuries.
So it is in the Brush business. One Company stands forth above all others, deep-rooted in the field it covers, built up by years of growth, by increased demand for its product, by *service rendered* to the customer. It has weathered the fiercest storms of competition. It possesses the strength—the facilities—to continue to supply a product of steadily Uniform Quality. This Company manufactures
LeCarbone
Brushes. Uniformity of Quality—Different Grades for Different Service—These are the seeds from which has grown steadily the demand for Le Carbone, until today it overshadows that of all other carbon brushes.
W. J. Jeandron
173 Fulton St. New York

Making Good in New York



Rollway Bearings



For the past three years the Third Avenue Railway of New York has been operating thirty storage battery cars equipped with Rollway Bearings. They have been making a splendid record for low maintenance cost.

Rollway Bearings require *less lubricant* because they reduce friction and they are oil-tight and dust-proof.

They *reduce maintenance* cost. They have a fixed adjustment, thus requiring no adjustments.

They save fifteen per cent. of the total amount of power required to run the car.

We will gladly give you figures. *Write.*

The Railway Roller Bearing Co.

SYRACUSE, N. Y.





This Ephrata and Lebanon Street Railway Co.'s car is mounted on Baldwin trucks, Class "K."

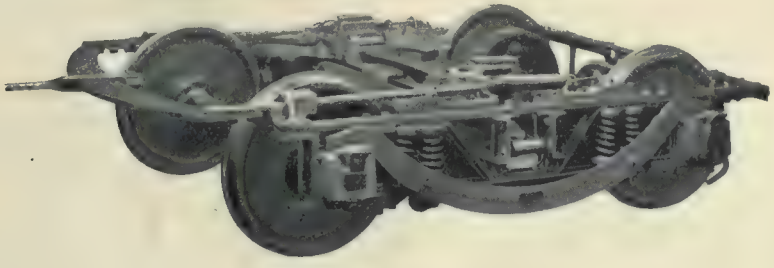
WHY?

SAFETY FIRST. In the design and workmanship of all parts; in the proper consideration of the elastic limit of the material.

SECOND — ECONOMICAL MAINTENANCE. The wearing parts have renewable wearing plates or hardened bushings.

THIRD—SIMPLE CONSTRUCTION. The parts are few in number, easily removable and held together by taper turned bolts in reamed holes. The gussets are substantial, and each truck is a unit.

FOURTH — NOISELESS OPERATION. The truck frame is strong, light and rigid, and the bolted brake with compression springs is chatter-proof.



Baldwin Truck, Class "K"

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

Charles Riddell, 625 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1610 Wright Building, St. Louis, Mo.
F. W. Weston, 50 Church Street, New York, N. Y.
George F. Jones, 407 Travelers Building, Richmond, Va.
A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.
J. A. Hanna, Niles, Ohio

42 Per Cent

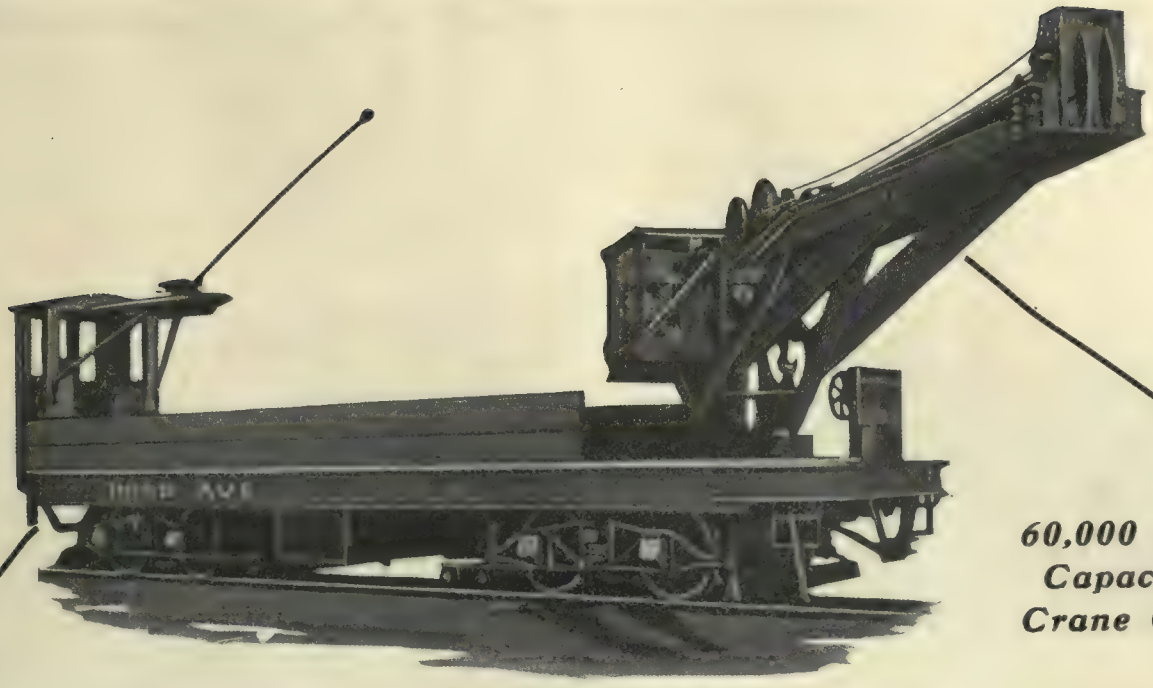
of the all-steel cars ordered during 1914 for electric traction service were "Cincinnati" Cars.

It is a noteworthy fact that the Cincinnati Car Co. was awarded orders for a majority of the cars of this type built—in this—the most important year in the advance of all-steel cars.

The Cincinnati Car Co.

Winton Place

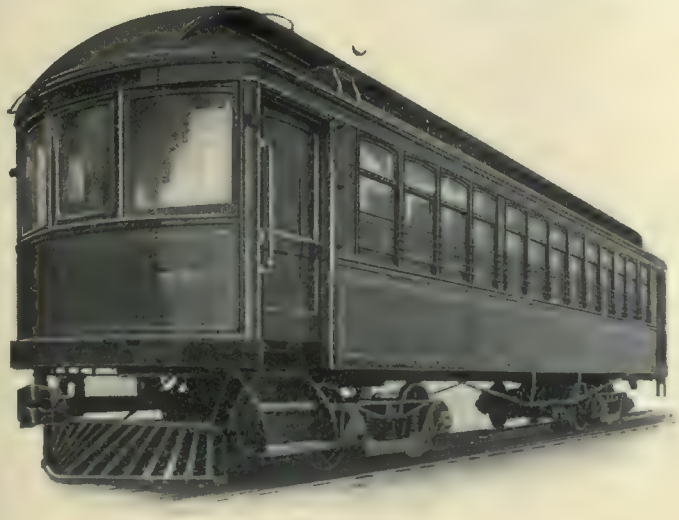
Cincinnati, Ohio



60,000 Lb. Capacity Crane Car

Built by McGuire-Cummings Mfg. Co.

The McGUIRE-CUMMINGS Car-Building Organization



Can render you an especially valuable service in designing and building standard and special equipment to meet all requirements.

The season of new construction is opening up—we shall be pleased to quote you.

McGuire-Cummings Mfg. Co.

General Offices

Harris Trust Bldg., Chicago

Builders of City and Interurban Cars, Trucks, Sprinklers, Crane Cars, Work Cars, etc.

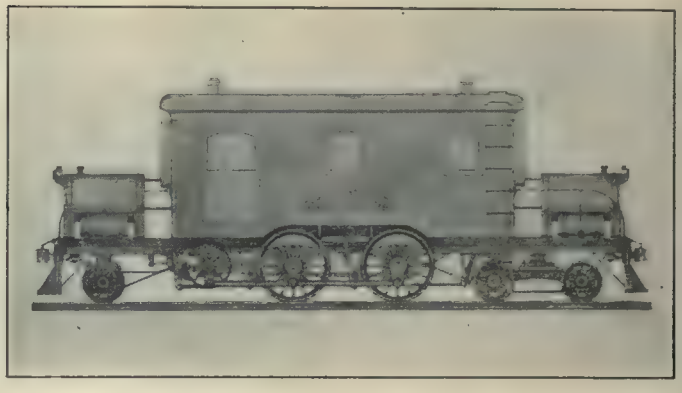


6000 Gallon Sprinkler—One of a Number of Designs We Build.

Internal Combustion Locomotives

The Motive Power You Have Long Desired





20 Ton Gasoline Locomotive

46-inch drivers
Five to 45 miles per hour
Develops 450 horsepower
Single end control
Three speeds forward
Three speeds reverse

40 Ton Gasoline Locomotive

54-inch drivers
Five to 60 miles per hour
Develops 800 horsepower
Double end control
Three speeds forward
Three speeds reverse

All Locomotives Equipt with Electric Starters, Lighters and Generators.

IDEAL POWER—The ideal power for surface, subway and elevated lines. Also for local and terminal service. No smoke.

FUEL—Gasoline—Ozoline—Oil or Distillates.

OPERATION—A One-Man Pneumatic Operation.

Biggest and Best Transportation Proposition of this Century.

Write Us—It will Pay You

Internal Combustion Locomotive Co.

Equitable Bldg., Wilmington, Del.

J. W. McKay, General Manager

3103

Taylor Trucks—Modern Equipment

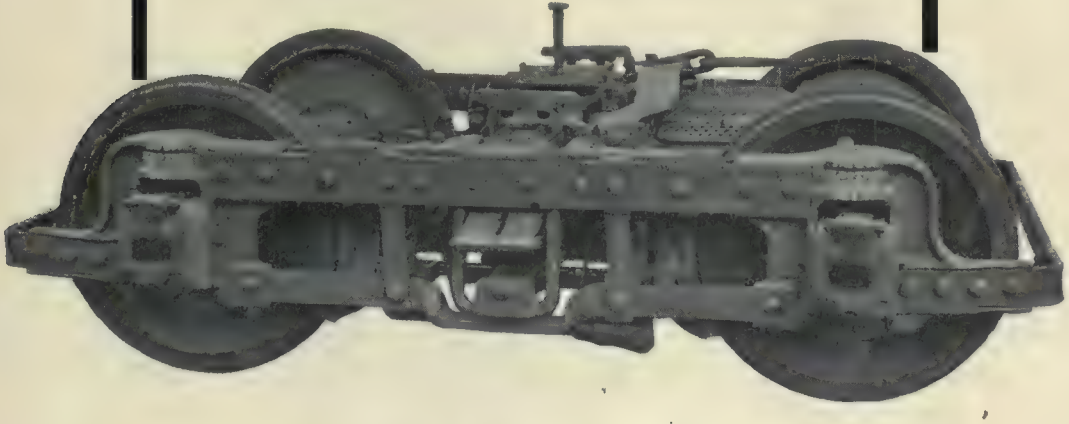
The new cars for the Morris County Traction Co., Morristown, N. J., represent the most advanced type of car construction throughout. It is significant, then, that TAYLOR TRUCKS were chosen for Morris County service.

If the trucks are "TAYLOR-MADE," ease of riding, durability and lowest cost of maintenance are assured.



Specifications

Type: Taylor Improved L. B. double truck.
Wheel Base, about 6′ 0″.
Brakes and Motors, inside hung.



Send for Portfolio

of "TAYLOR-MADE" Trucks with description and specifications.

Taylor Electric Truck Co.

ESTABLISHED 1892

Main Office and Works: TROY, N. Y.

We also manufacture Coil and Elliptic Springs for any type and make of truck, and T. M. C. Steel Tired Wheels.

2103



Storage Battery Car of the Third Avenue Railway Co., New York City

"Exide" Batteries in Traction Service

Storage battery cars are receiving the consideration of railway men on both steam and electric roads.

Steam roads can frequently add to their revenue by giving more frequent service between small stations. This can be done most satisfactorily by storage battery cars operating over the same tracks as steam trains.

On electric lines where traffic is light or where an infrequent schedule is desired, storage battery cars furnish a more profitable service, than any other system.

Storage battery cars have been successfully used in New York City since 1910. There are now 205 battery cars in operation in New York, 174 of which are equipped with the "Hycap-Exide" Battery. These battery cars are making a total of over 3,000,000 miles a year. The service rendered by these batteries is in every way satisfactory.

"Exide" batteries are also used by many of the large railway and power companies in their electric trucks and electric service wagons.

Our engineers are at the disposal of railway men interested in the subject of electric traction with storage batteries, either in connection with storage battery cars or electric trucks.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator"

The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

Boston Atlanta Rochester Cleveland **PHILADELPHIA, PA.** Chicago Denver San Francisco
New York Washington Pittsburgh Detroit **1888 - 1915** St. Louis Los Angeles Toronto



Storage Battery Car of the Lewisburg, Milton and Watsontown Pass. Ry. Co., Milton, Pa.

NILES

"Commercial Shape" Steel Construction



as practiced in small single-truck city cars.

The underframe is built up without shearing strains. The sub-sills rest directly on the truck; cross sills on sub-sills and side sills on ends of cross sills; all riveted together with gussets or angles.

The sides are plate cantilever girders from sills to letter panels.

Continuous top plates or continuous post-carlines are optional with purchaser. We advise continuous top plates and separate carlines.

The letter panels form a continuous steel hoop entirely around top of car preventing sagging or spreading.

We recommend solid side walls of steel, cork and Agasote, wooden floor and double roof with dead-air space.

Parts are riveted and separable, being welded only where necessary to exclude water.



Length, 32 feet 0 inches; Seating Capacity, 32.

NILES "ALL SERVICE" CAR

It can be operated one-man or two-men, near-side or far-side, single-end or double-end, prepayment or collect. In fact, it meets *all* requirements for single-truck cars for small cities and non-paying branches or feeders of large systems.

Let us tell you more about it.

PREDICTION

The single truck car of the future will be run by one man and will convert many non-paying lines into profitable ones.

Depressed separable platforms will be eliminated. The steel underframe will extend continuous from buffer to buffer, with step and door openings cut out at right of motorman.

It will be mounted on a truck with long wheel base, small diameter wheels and motors to allow low steps.

The body will weigh about 10,000 pounds, seat about 30 and carry double that number.

It will be of light steel construction of standard commercial shapes and sheets which can be replaced independently of the car builder.

We are building that car now and can supply duplicates for quick delivery.

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PLAIN OR TREATED OPEN TANK METHOD

Shipped from Chicago yard same day order received

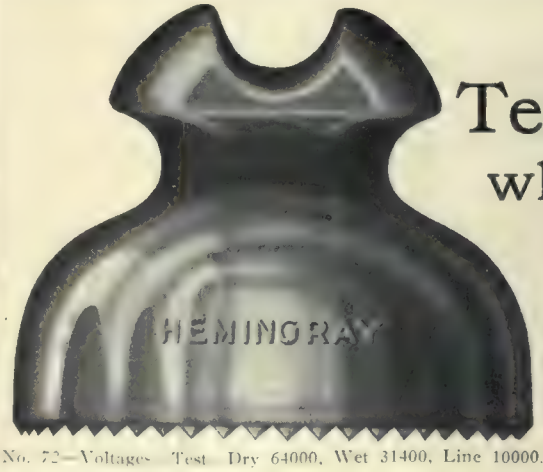
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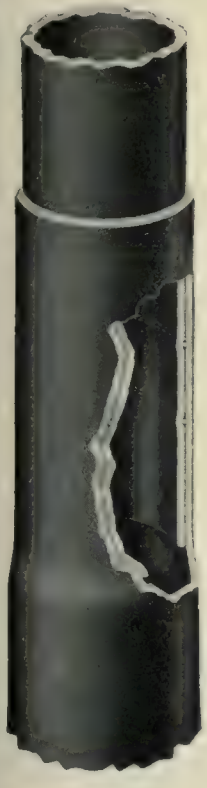
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2104

Wire Lock Swedge Joints Build Strength into Tubular Steel Poles





A water-tight joint which will stand an internal pressure test insures that no moisture will ever work in to corrode the pole at this point.

The sectional view clearly shows how the joint grips. Notice that the steel tube is of uniform thickness throughout the joint. In fact the material is thickened in place of being stretched and thinned, as in the ordinary process of swedging by hammers.

This is the joint that *perfects* the steel tubular pole.

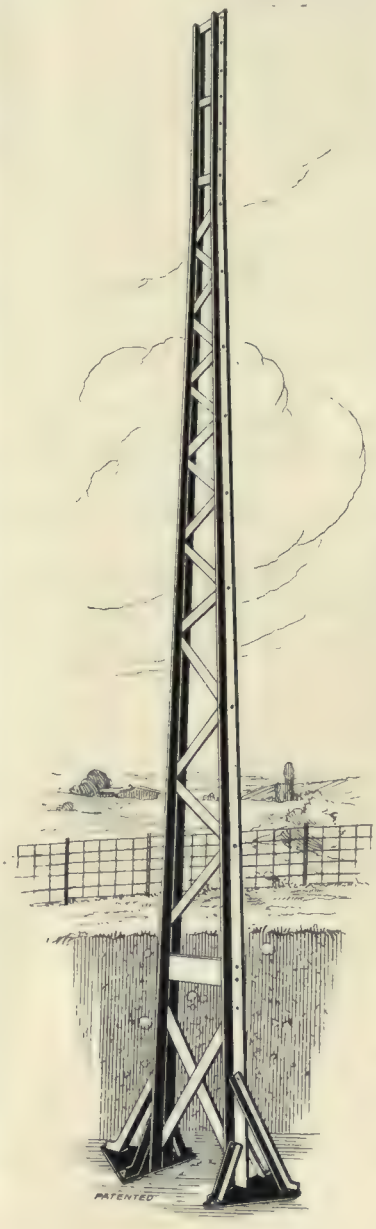
The catalog contains valuable and interesting data on overhead construction.

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The cut shows a light design for telephone or telegraph lines—there is a heavier type for transmission line work.

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Our T-Rail Special Work

For Your Interurban Line or Private Right of Way

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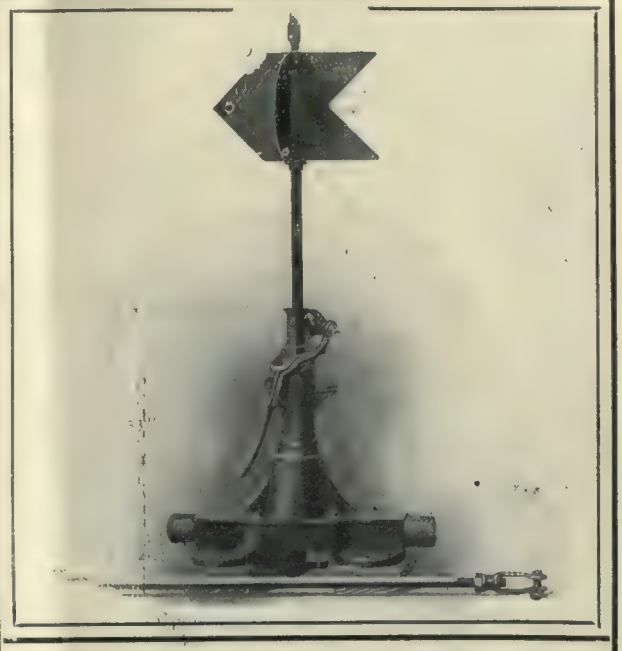
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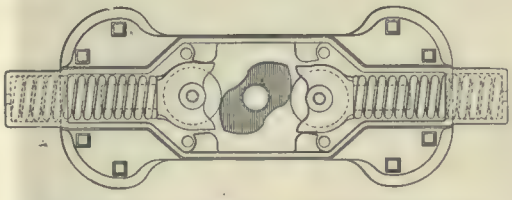
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Showing Mechanism Half Thrown Automatically.

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Built for rapid work. Makes a clean sweep, and serviceable the entire year.

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On yearly contracts we have an interesting proposition we would like to make you. The low cost will surprise you.

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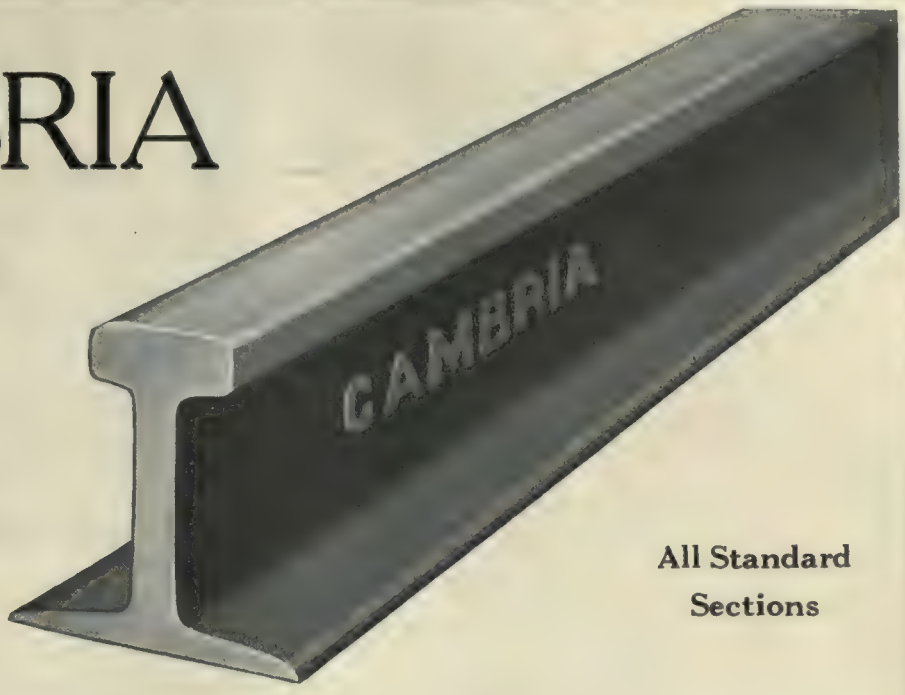
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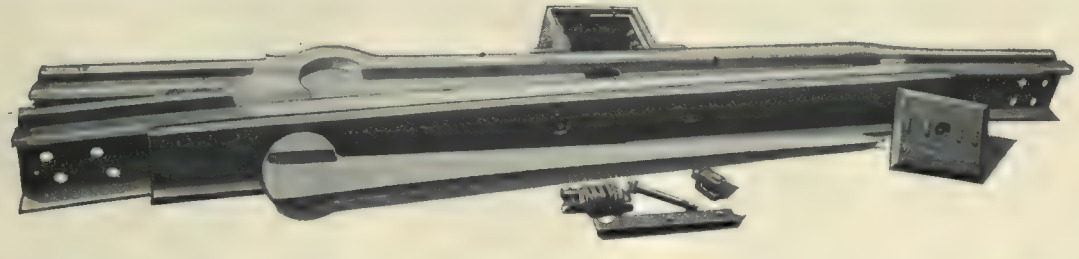
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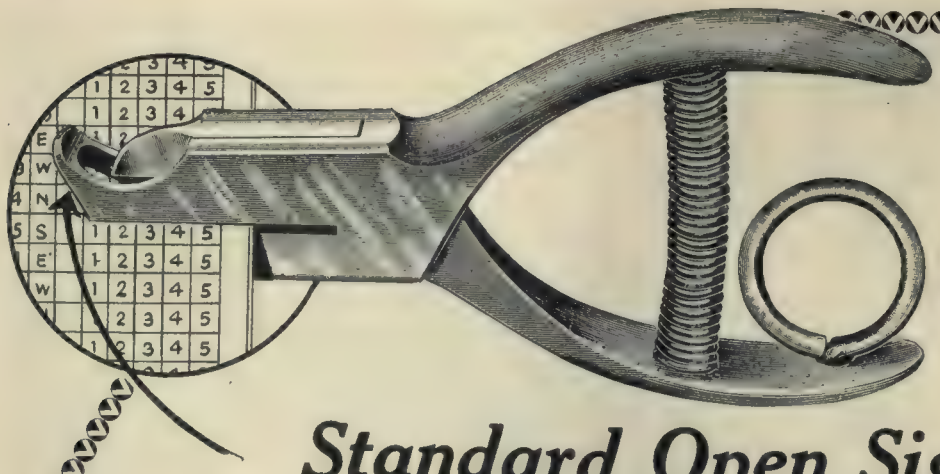
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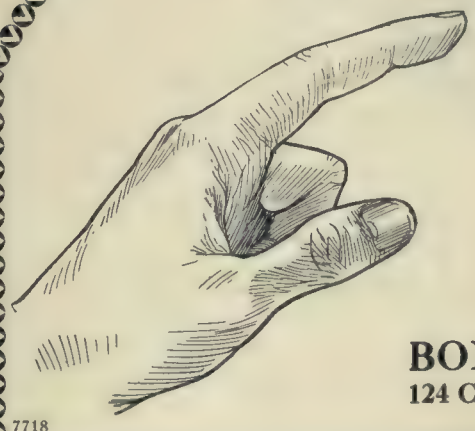
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The conductor can see *through* the punch, enabling him to punch the correct spot with speed and precision. This is a great advantage, especially on lines where traffic is heavy, promoting better service in behalf of both company and public. The tool steel dies in B-V Punches insure long service and economy. They cost no more than the ordinary kind. Send for prices and catalog.

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For Electric Railway Power and Sub-Stations

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Retrieving Spring adjusted to meet any trolley pole tension.
Action of this spring does not affect service spring.
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Little mechanism, few parts easily cared for.
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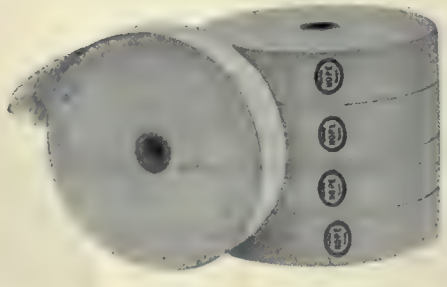
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Easily Adjusted

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It tells all about piston rings and why you should equip your engine with the LEAK PROOF. How it will pay you in fuel economy and prolonged motor life. Write for it.

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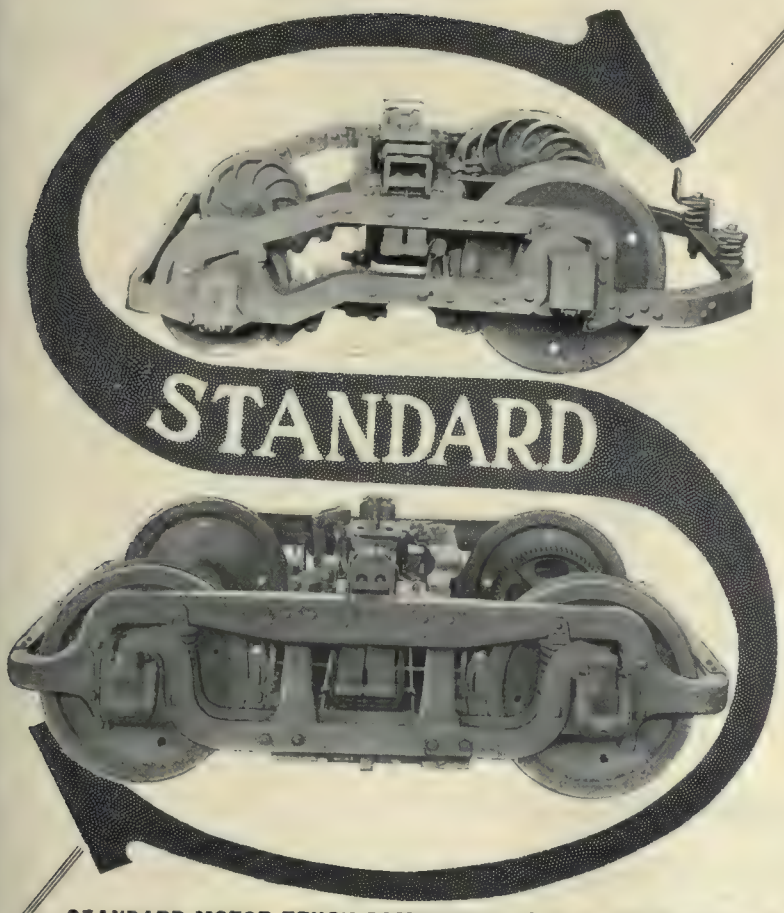
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Look for the name LEAK PROOF stamped on the Ring



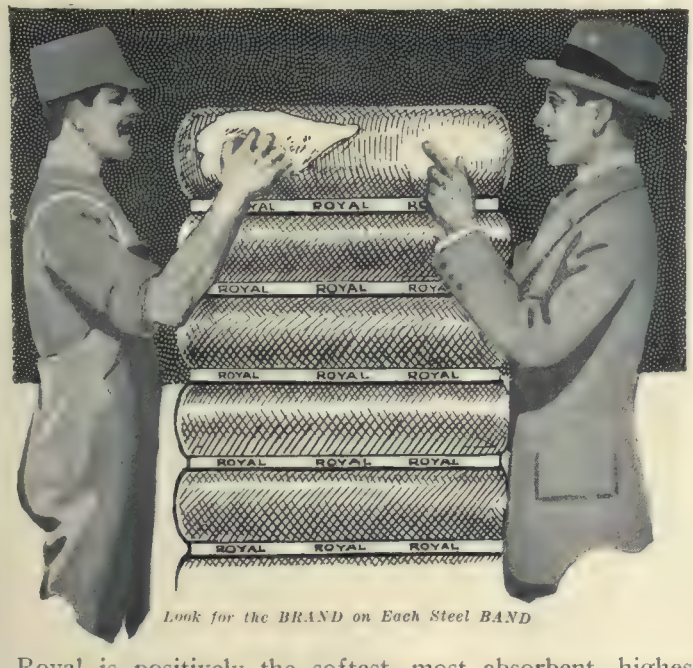
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Now offers you in addition to the Highest Quality Waste, *these three vitally important features:*

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Our special trolley trade deal offer makes it possible for you to have maximum efficiency at minimum cost.

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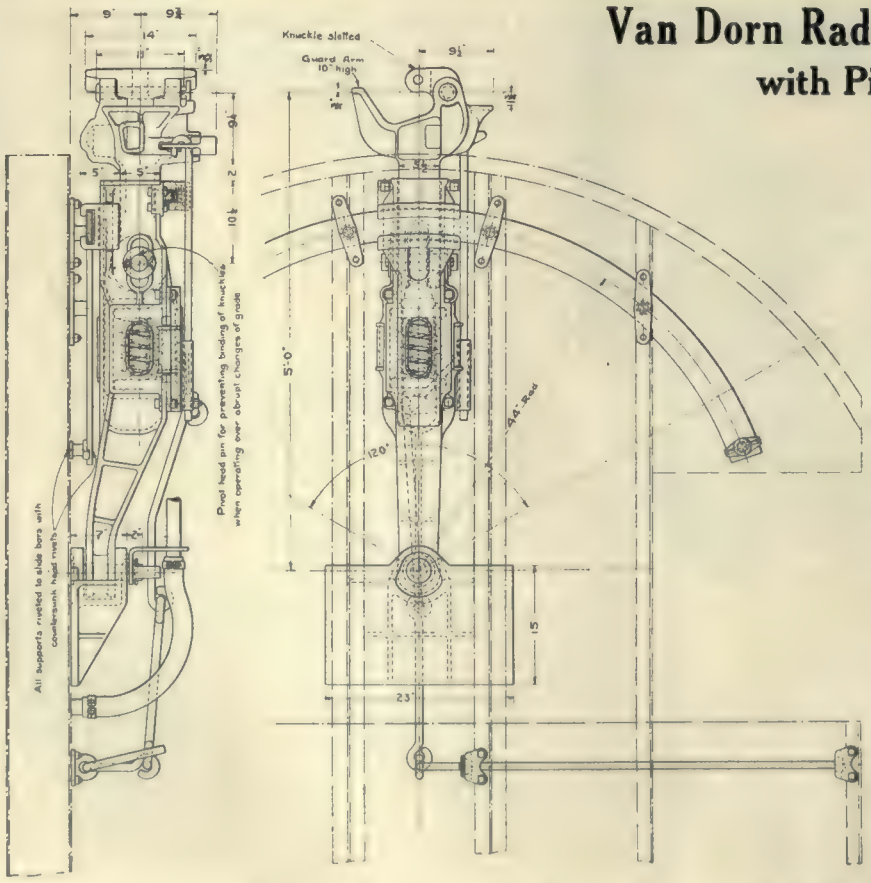
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Has extended guard arm and butting wall. Prevents buckling in coupling and in train operation.

Pivoting head (M. C. B. type) prevents binding on severe changes in grade.

Head has deep knuckles which permit wide vertical movement.

Radial carrier eliminates binding even on 30 foot radius curve.

Draft rigging has double Hercules springs which effectively absorb impact shocks. Anchors close to sills give strong anchorage and proper clearance.

Uncouples from side of car.

Write for blueprints and additional information.

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THE high surface hardness combined with great strength and refinement of structure results in gear mileage, which will approximate the life of the average railway axle. At the same time the relatively low cost assures more economy ultimately, than any other grade of gearing now on the market.

BP Gears and Pinions provide an economical and efficient motor gearing.

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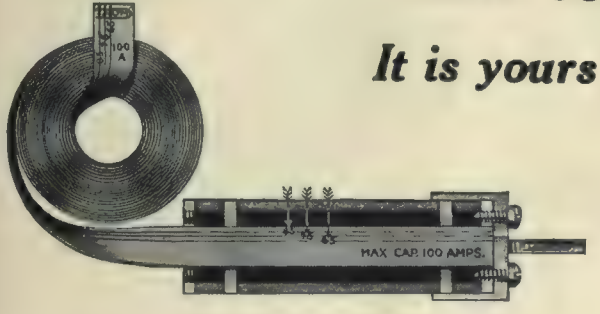
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It is yours for the asking.



A Daum fuse strip. You do not have to carry different fuses for different amperage.

The cost of the "Daum" is 1/30 of that of regular cartridge fuses, the former costing one and one-third cents for 100 amperes, 250 volts; while the regular fuses cost forty cents. Our guarantee on all purchases. Money back if the fuses are unsatisfactory.



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Makers of the First Successful Refillable Fuse on the Market.

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Safety and Economy in Electric Railway Wheels



Electric railways strive to maintain their rolling stock with the least possible expense; that is, they must keep their cars out of the repair shops. To do this necessarily means they must use wheels that will not require frequent renewals.



F. C. S. Wheels

are one-wear wheels that do not have to be shopped for frequent turning,—all that is necessary to remove flat spots is to run the car onto a pit grinder for twenty to forty minutes at night when in the barn and the wheels are ground truly cylindrical and are as good as new, saving the expense of removal from truck.

The composition of the flange and tread insure a hard wearing surface indicative of long service. Tests that have been made prove that brake shoe wear on chilled iron wheels is twenty to twenty-five per cent. less than on any other type of wheel.

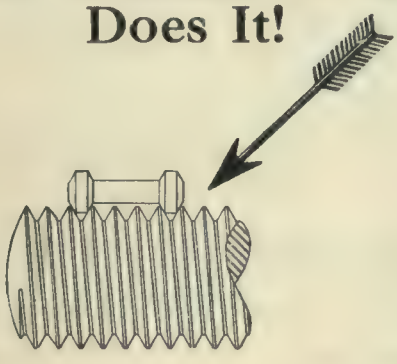
F. C. S. wheels are designed to meet the demands to be imposed upon them by the weight of car, speed, brake pressure, condition of track, etc., on each individual system, therefore insuring safety to a maximum degree.

GRIFFIN WHEEL COMPANY

PLANTS: Chicago Detroit Denver Los Angeles St. Paul Tacoma Kansas City Boston



This Rolling Wedge Does It!



That's the Reason for the Absolute Locking, Safety, Security and Economy of the

"ABSOLUTE" Lock-Nut

Observe the recess which has been cut across the nut at right angles to the threads. The floor of this recess slopes. Notice also the rolling wedge. When the nut is being applied the pin rests in a deeper part of the recess and rolls with the bolt.

The moment the nut starts to back, it immediately encounters the resistance caused by the rolling pin wedging itself into the higher level of the sloping floor of the recess. The result—all motion is stopped. The nut is locked absolutely. The greater the pressure tending to back the nut, the tighter it locks.

Vibration tightens the *Absolute*. Rust and dirt do not destroy its action.

Easily removed by inserting a common nail alongside the rolling wedge, preventing it from wedging.

It's as strong as any bolt. Write for results of tests.

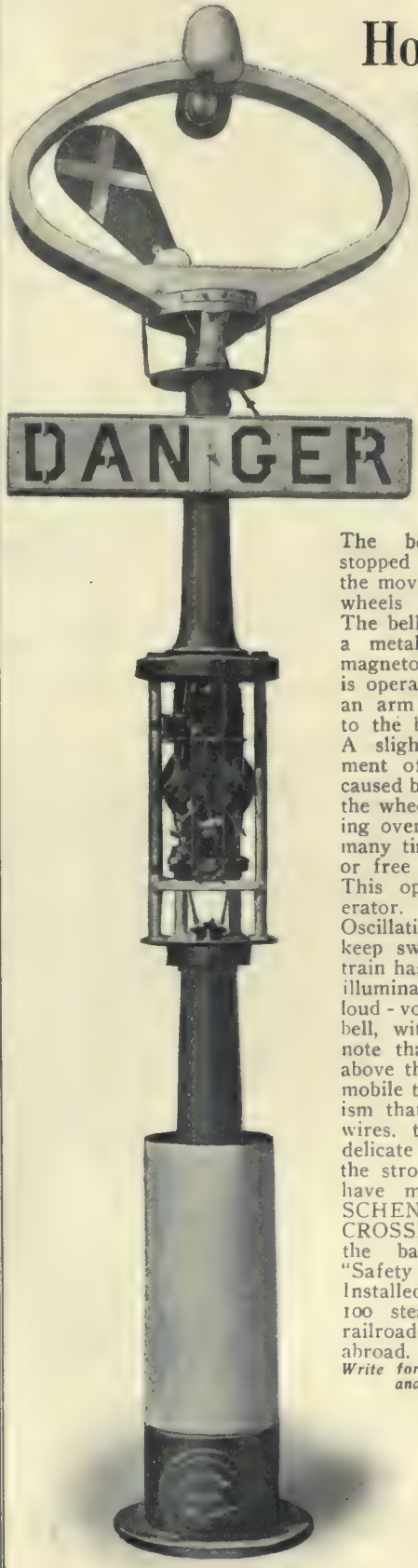
The *Absolute Lock Nut* is nut and lock-nut, all in one. Saves in bolt length and time of application, as well as insures safety and certainty.

Costs no more than nut-locks. Write for catalog describing it.

The American Lock-Nut Co.
Pullman Station, Chicago

Maximum Certainty and Safety with Minimum Installation and Maintenance Cost

The Hoeschen Highway Crossing Signals



Does not intertere with track circuits and is not operated by trolley current. Free from electrical troubles.

The bell is started, stopped and wound by the movement of the car wheels over the track. The bell is connected by a metallic circuit with magneto generator which is operated by means of an arm clamped rigidly to the base of the rail. A slight lateral movement of the rail head, caused by the pressure of the wheels of train passing over it, is multiplied many times at the outer or free end of the arm. This operates the generator.

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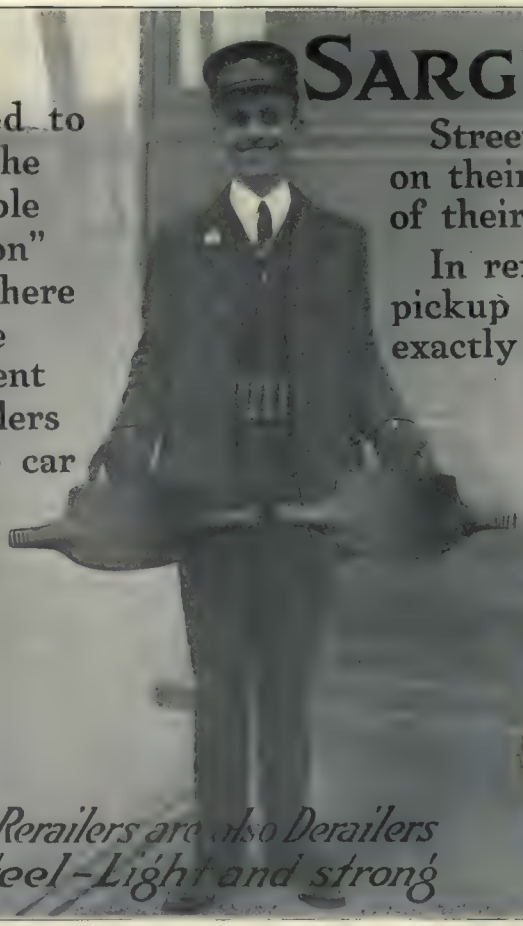
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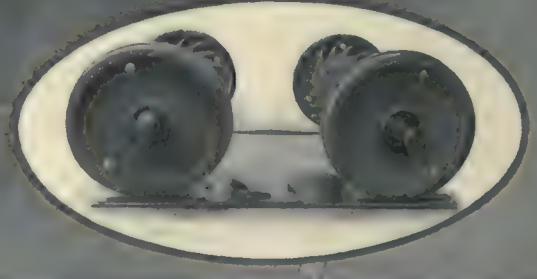
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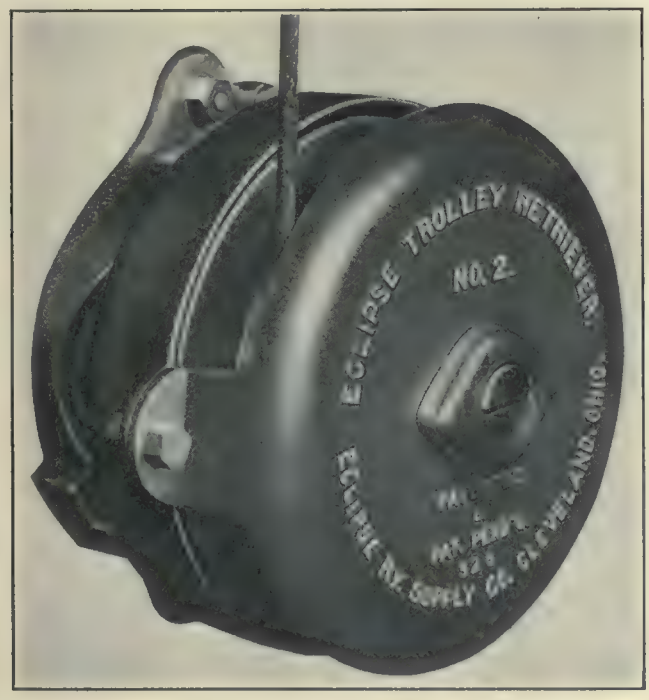
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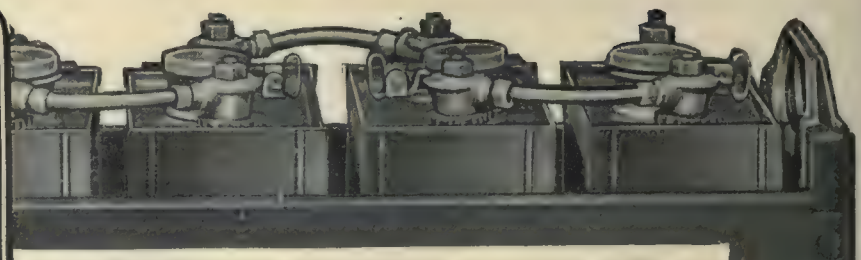
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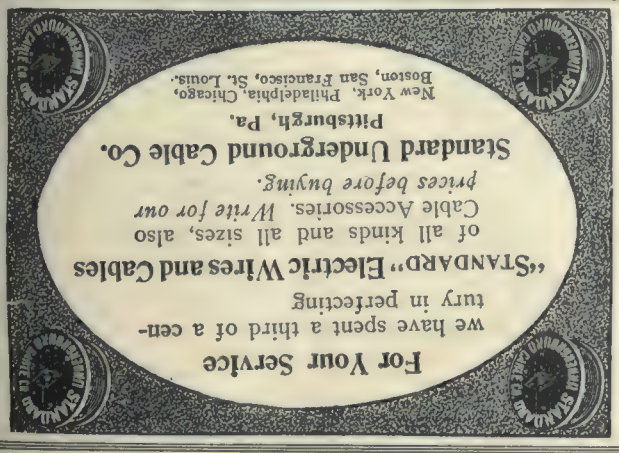
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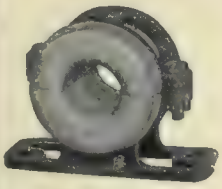
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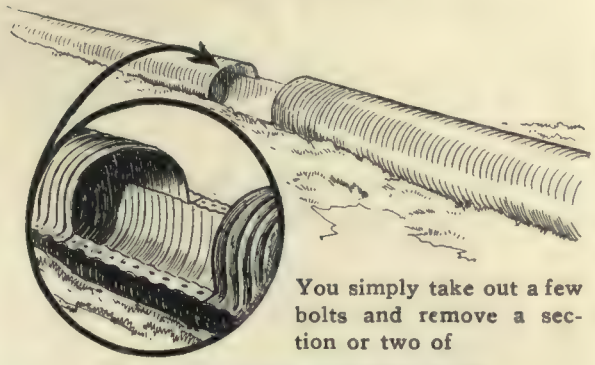
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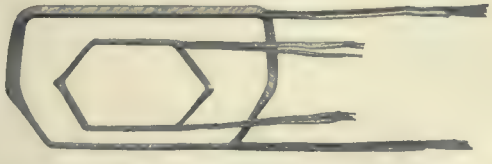
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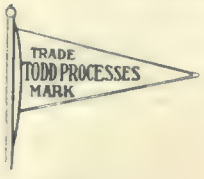
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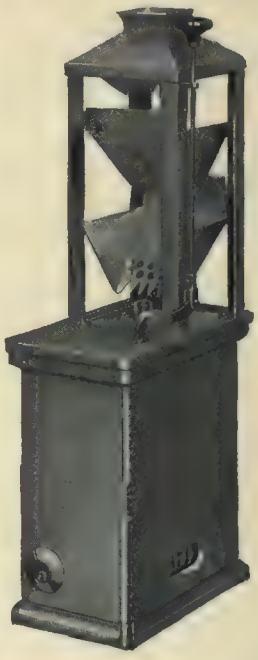
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With this device the conductor readily makes his change with *one hand*. No bungling around, fishing into various pockets for coins of different denomination. He has one hand entirely free to ring up fares, assist passengers, distribute transfers, etc.

No prepayment system complete without one.

Catalog describes it fully—write today.

CHAS. F. ETTER

904 N. Second St., Harrisburg, Pa.

8932-P

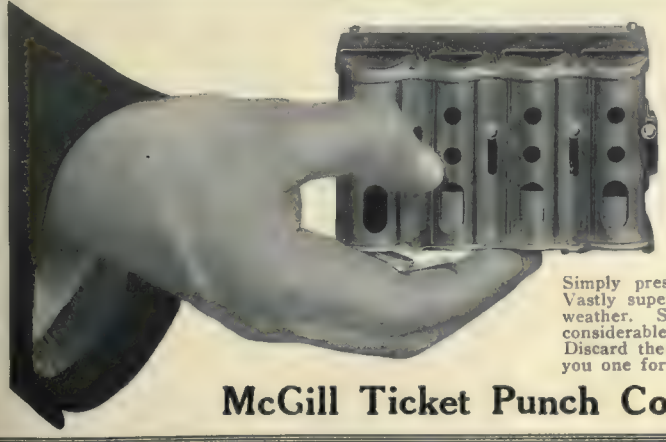
SAFETY FIRST — ECONOMY renewable cartridge FUSES

SAFETY FIRST—ECONOMY NEXT

Non-renewable fuses are an expense. A good, renewable fuse is an investment.
The only good Renewable Fuse on the market is marked "Economy"

Write for Catalog No. 2 and Bulletin

ECONOMY FUSE & MFG. COMPANY, KINZIE AND ORLEANS STS., CHICAGO



It Throws the Coins Into the Conductor's Hand

The McGILL Improved Change Carrier

Simply pressing down on the thumb lever ejects the coins rapidly and easily. Vastly superior to any other method. Can be operated by gloved thumb in cold weather. Saves conductors many valuable minutes during rush hours as well as considerable annoyance on every trip occasioned by fumbling in making change. Discard the old type. It's obsolete compared to this improvement. We will send you one for examination.

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PARMENTER WHEEL GUARDS are *always working*. They cover the rail on curves as well as on tangent track, for they ride close to the wheels and close to the paving. They have proven efficient at all speeds up to fifteen miles an hour.

Your claim agent will be glad to have our interesting data.

Parmenter Fender & Wheel Guard Co.

89 State St., Boston, Mass.

9269 2

Why Not Buy Trolley Base and Retriever All in One



That's What You Get In

The WASSON *Air-Retrieving* Trolley Base

It performs the double function. It combines the ordinary trolley base with a retrieving mechanism operated by air. It's the "last word," the latest development in the field. It means maximum efficiency in car operation, as far as the trolley can contribute toward it. It means rapid transit without fear of jumping trolleys. It means freedom from damaged or torn down overhead if the trolley should leave the wire. Try it out. If it does not "make good" it costs you nothing. Order one today.

The Wasson Engineering & Supply Co.
Milwaukee, Wis.



If It's a "Globe Ventilator Car"

it's a *ventilated* car. Fine design on perfect ventilating principles at surprisingly low cost. "Globe" for Air Comfort.

Globe Ventilator Co., Troy, N. Y.

1

The Kalamazoo Trolley Wheels

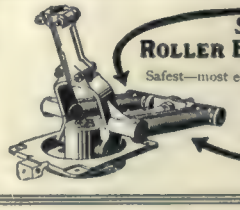
have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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KALAMAZOO, MICH., U. S. A.

The Peter Smith Heater Company leads the world on heating City and Interurban Electric cars of all sizes and makes. Ask us to prove this statement. We have the experience back of us.

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1759 Mt. Elliott Ave., Detroit, Mich.



SIMPLEX
ROLLER BEARING TROLLEY BASE

Safest—most economical. Tension INCREASES as pole goes UP, decreases as pole comes DOWN. No more bent poles or knocked down wires. Full particulars from

THE TROLLEY SUPPLY CO.
Canton, Ohio

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

UNION SPRING & MANUFACTURING CO.

SPRINGS COIL AND ELLIPTIC

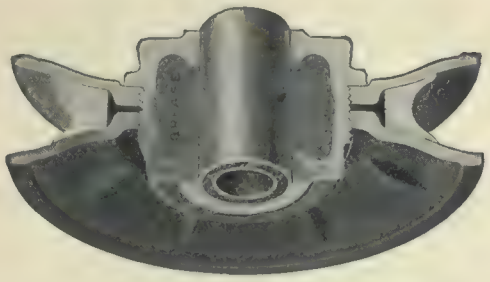
M. C. B. Pressed Steel Journal Box Lids

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Works: New Kensington, Pa.

149 Broadway, New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

No Lubrication



Universal Trolley Wheel

It lubricates itself. Large grease cups in the hub provide lubricant as long as the wheel lasts, and some of our users tell us that its life is twice as long as many.

Built with a special harp, contact spring, bushing and pin, that all make a saving in time and cost.

THE PRICE WILL INTEREST YOU.

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Northampton, Mass.
AUTOMATIC VENTILATOR CO., Sales Agent
2 Rector Street, New York City

9484

IF you are using any other type of conduit than Duraduct for your lighting and heating systems, you are wasting money.

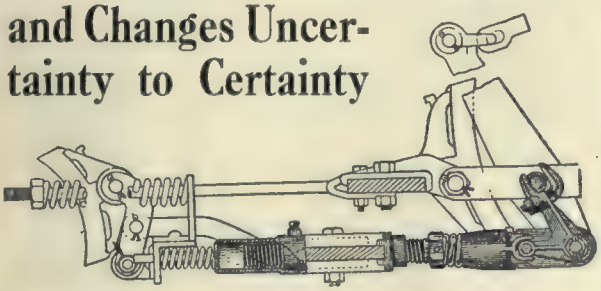
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Flexible Non-Metallic Conduit will give 100% in efficiency—saves 66 2/3% in cost—and 85% in weight. It is also easier and cheaper to install.

Tubular Woven Fabric Co., Mfrs., Pawtucket, R.I.
A. HALL BERRY, General Sales Agent
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Eliminates the "Man Factor" and Changes Uncertainty to Certainty



The ANDERSON
Automatic Slack Adjuster
Keeps the Brakes Always in Proper Adjustment

Each device can be installed on any type of truck in about 15 minutes without involving changes in the brake rigging. Once installed requires no further attention, but is itself always "on the job" automatically compensating for wear of the brake shoes. This device keeps the brakes in proper adjustment at all times.

Write for full description.

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William R. Garton, Sales Engr., 299 Broadway, N. Y.
Grayson Railway Supply Co., Southwestern Rep., St. Louis, Mo.
2

BRAKE SHOES

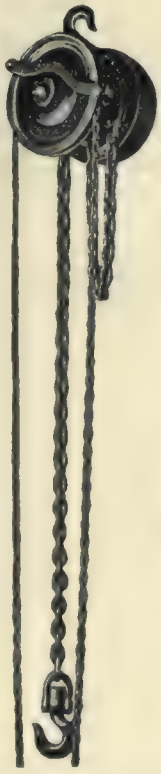
The Brake Shoe Business

No one man can know more than a small portion of the vast fund of information relating to brake shoe design, construction and application. But *collectively* the members of the American Brake Shoe and Foundry Company know a great deal about brake shoes and braking. Our knowledge has saved thousands of dollars to many electric railways. We are at *your* service.

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MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago
71607 1



Time is saved: work is speeded by using



FORD TRIBLOC CHAIN HOISTS

No matter what size you need or how severe the service you will find the Tribloc a most satisfactory and efficient Chain Hoist.

It is built in sizes from ¼-ton to 40-ton capacity. It has planetary gearing (which is enclosed in a dustproof steel case), steel parts, a 3½ to 1 factor of safety in its weakest parts, and eighty per cent of the power applied to the hand chain is converted into lifting energy.

The chains and hooks used on the Ford Tribloc are of the best material and workmanship procurable, and all our claims are backed by a five-year guarantee.

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142 Oxford St.
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¼ to 2 Ton Tribloc Hoist

E.G. Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street New York

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Leaf and Coil Springs
MCB Pressed Steel Journal Box Covers

Full Power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

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7179 3

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LUBRICATION OF SWITCHES

One of the largest steam roads in the country uses TULC No. 2 VH in the switch and lock movements, switch cylinders and signal mechanism. The reason as given by the Purchasing Agent was "TULC is *economical* in that a *small quantity* only is needed for lubrication."

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Schofield Building CLEVELAND, O.

TRADE IRCO MARK

QUARTER CENTURY

Experience

INSULATIONS, MATERIALS AND SUPPLIES

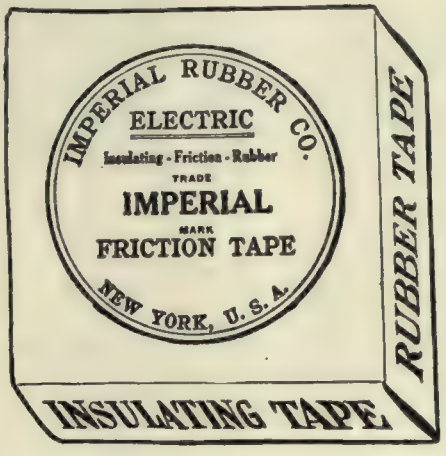
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that the most satisfactory varnish it could put inside and outside of all its steel cars, including the new all-steel trailers which it is providing for its summer suburban traffic is

VALENTINE'S VALSPAR

The Varnish That Won't Turn White

This was the only manner in which the railroad, in common with many other carriers, could combat the checking of the paint on the steel surface, which resulted from the excessive expansion and contraction inevitable in a steel structure.

The saving in repainting to the roads using Valspar makes a big item.

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Write for the new book on steam and electric railway car painting. It is free.

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MAC GOVERN AND COMPANY, INC.

114 LIBERTY ST., NEW YORK CITY, Phone, 3375 Rector

60 Cycle Turbo-Generator Units

FOR IMMEDIATE DELIVERY FROM STOCK

One 1800 KW. (.8 P. F.) General Electric, ATB, 2-pole, 2300 volts, 3600 R.P.M.

Turbine, Curtis, 3-stage.

Dimensions:

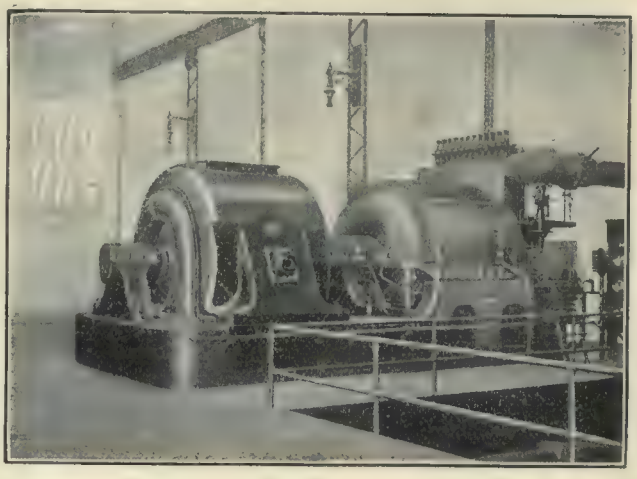
Length, 18′ 5″.

Width, 7′ 9″.

Height, 7′ 5″.

Net weight, 66,000 lbs.

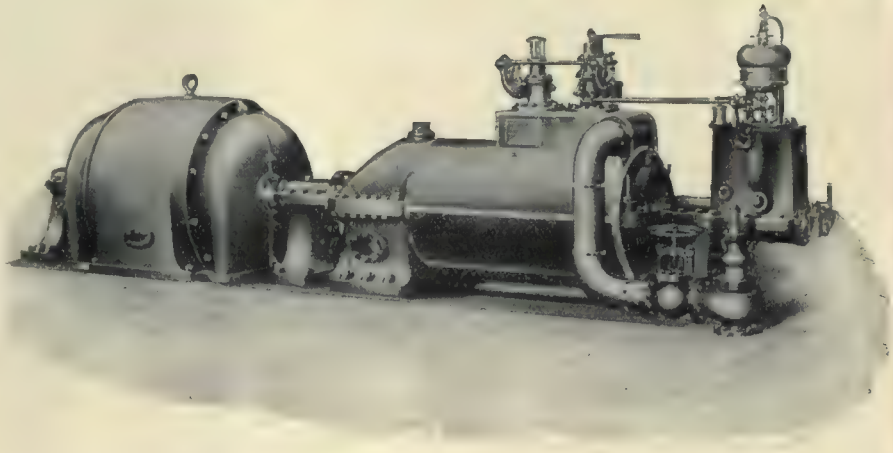
Switchboard with instruments.



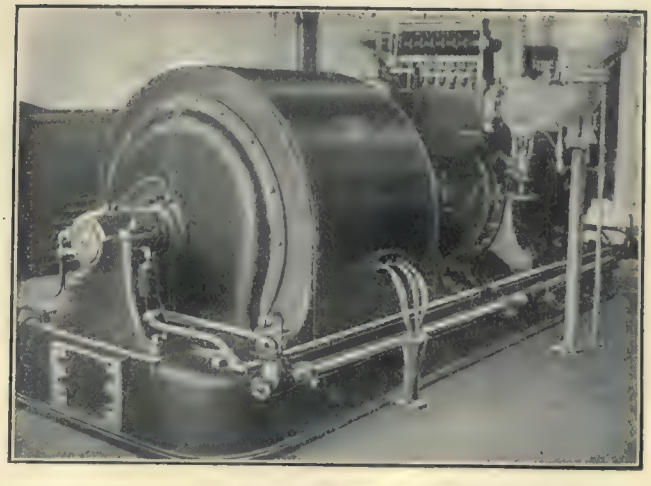
Three 500 KW. Westinghouse-Parsons, 2-pole, 440 and 2300 volts, 3600 R.P.M.

Condensers, Bulkley Barometric.

Switchboards with instruments.



One 500 KW. (.8 P.F.) General Electric ATB, 4-pole, 2300 volts, 1800 R.P.M.
Turbine, Curtis.
Dimensions:
Length, 12′.
Width, 6′ 11″.
Height, 7′ 7″.
Net weight, 35,000 lbs.
Switchboard with instruments.



Write for our complete catalog. Please send us details of anything you desire to buy or sell in the way of generators, motors, generating sets, rotaries, transformers, engines, etc.

FOR SALE



20–Combination Interurban Cars–20

Builder, Kuhlman Car Co.
Length over corner posts, 43′
Length over all, 53′ 6″
Width over all, 8′ 5″
Pilots, wood
Sanders, air
Heaters, electric
Headlights, Crouse-Hinds arc
Seats, Main Compartment, leather
Seats, Smoking Compartment, rattan
Seating Capacity, 58 passengers
Trolley Retrievers, Earll
Toilet, dry hopper
Draw Bars, Ohio Brass Co. M. C. B.

Air Brakes Westinghouse A.M.M. Combined Straight and Automatic

Trucks

Builder, Baldwin M. C. B.
Wheel Diameter, 37″
Wheel Type, Rolled Steel
Wheel Tread, 3″
Wheel Flange, 3″
Wheel Base, 7′
Axle Diameter, 6″
Journals, 5″ x 9″

Electrical Equipment

Motors, 4 West. 119
Capacity, 125 H.P. each
Control, West. Type A. L.
Circuit Breakers, two

Above cars have smoking compartments, and are equipped for train line operation. The wiring is installed in conduit throughout.

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W. R. KERSCHNER COMPANY, INC.

Hudson Terminal Building, Room 1882, 50 Church Street

NEW YORK

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60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "H.C," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary.
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M. Also following transformers:
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3—175 K.W. Stanley, 10,000-2300 volts.

25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

Railway Car Equipment

8—**75 H.P. Westinghouse, 112 Railway Motors,** 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
12—**G.E. 57 Motors,** 50 H.P. Each.
16—**G.E. 67 Motors,** 40 H.P. Each.
20—**G.E. 201 Motors,** 65 H.P. Each.

Booster Set

Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.
Complete with coupling and panel.

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Railway & Power Equipment Co.
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Established 1901
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OPEN and CLOSED
MOTOR and TRAIL
Write for Price and Full Particulars to
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE
FOR ALL THE STANDARD STREET RAILWAY MOTORS
GET OUR PRICE WE CAN SAVE YOU MONEY
America's Greatest Repair Works
CLEVELAND ARMATURE WORKS, Cleveland, O.

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight

ELECTRIC RAILWAY JOURNAL, 239 West 39th St., New York

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CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 13 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

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POSITION wanted by line foreman, on construction or maintenance. Experienced on heavy catenary and trolley construction. Married, sober and good references. Box 703, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

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45 Ft. Interurban Car

Combination Passenger & Baggage.
Seating Capacity 50; Baggage Room 8 ft. 1 in.

5,000 Gal. Pneumatic Sprinkler Car

30 ft. Over All; All-steel construction. Must move them at once.
WRITE or WIRE.

WALTER A. ZELNICKER SUPPLY COMPANY
ZELNICKER
St. Louis

FOR SALE

AT BARGAIN PRICES—One 120 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 200 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 300 KW, General Electric, 133 Cycle Single Phase Alternator. Address "H. F. W., Jr.," 309 Colby-Abbot Bldg., Milwaukee, Wis.

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Approximately 75 T. R. W. and Duncan 500 volt, 2-wire meters from 2½ to 150 amperes in first class mechanical and electrical condition. Have been recently tested and calibrated. Selling on account of changing customers to A. C. Address bids to Meter Department, Lehigh Valley Light & Power Co., Allentown, Pa.

Get Your Wants into the Searchlight

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.
The Alphabetical Index (see eighth page following) gives the page number of each advertisement.
As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.
If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

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Imperial Brass Mfg. Co.

Acetylene Service.
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Collier, Inc., Barron G.

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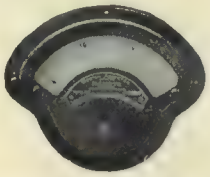
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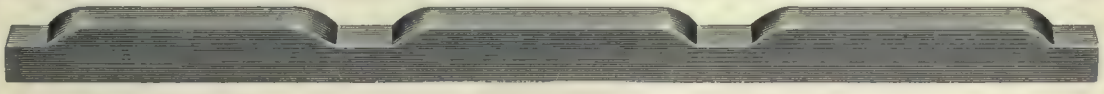
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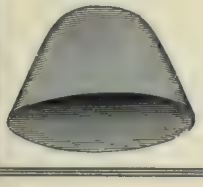
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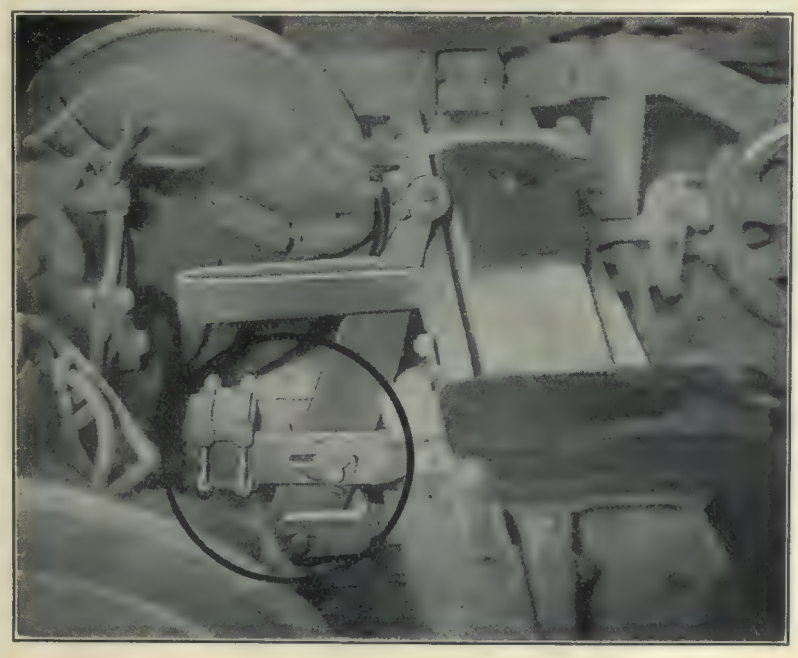


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Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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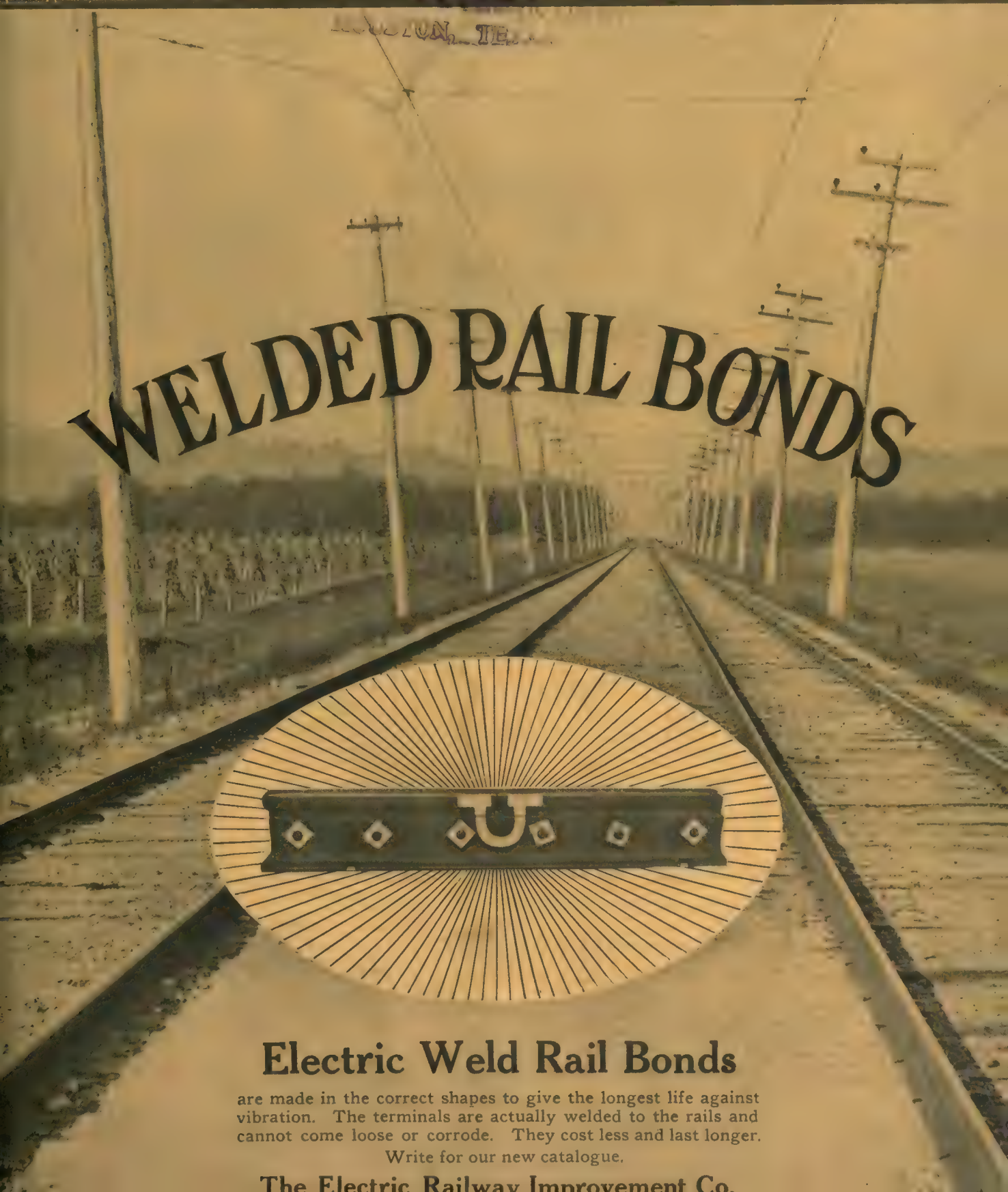
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ELECTRIC RAILWAY JOURNAL

olume 45
umber 13
arch 27, 1915

McGraw Publishing Co., Inc.



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are made in the correct shapes to give the longest life against vibration. The terminals are actually welded to the rails and cannot come loose or corrode. They cost less and last longer.

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The Electric Railway Improvement Co.

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EAVY DUTY
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LINE VOLTAGE
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LOW MAINTENANCE

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will insure maximum reliability and economy of operation on *your road.*

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over ten percent of all the electric railway properties in the United States are already using H L control, and nearly half-a-hundred new ones are adopting it every year?

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Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas.

Electric Railway Journal

New York, March 27, 1915

Volume XLV No. 13

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The New York Municipal Car—the Lighting 614

W. G. Gove and L. C. Porter describe the many lighting combinations which were tried in a full-size template car, resulting in the choice of fifteen 56-watt bowl frosted tungsten lamps along the car center line, beside emergency lamps.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 10 cols. Ill.

Report on Motor Vehicles 619

Committee on operation of motor vehicles presents report on "jitney" bus situation. Statement for the press. Cost analysis by bureau of fare research.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 10¼ cols. Ill.

Electrical Night at N. Y. R. R. Club 624

The recent progress in steam railroad electrifications was described before the New York Railroad Club. Discussions on other subjects by many speakers.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 2¾ cols.

Meeting of Illinois Electric Railways Association 626

Economies in power consumption, feeder-tap protection and care of commutators, and one-man cars were the topics of discussion at this meeting, which was held at the New Morrison Hotel in Chicago on March 19.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 5½ cols.

A. R. E. A. Convention Proceedings 629

An account is given of the action taken by this association on the various committee reports at its meeting in Chicago on March 16-18.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 2 cols.

American Association News 630

Committee meetings held this week included accountants' educational, engineering lightning protection, T. & T. training of transportation employees. Transportation committees active also.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 3 cols.

New England Street Railway Banquet 631

There was a large attendance at the annual meeting of the New England Street Railway Club in Boston on Thursday. New officers elected.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 3¼ cols.

Equipment and Its Maintenance 635

Thrust-Plate for Worn Car Axles—*By "Vulcan," A. M. I. C. E., A. M. I. E. E.* Equipment Defects—Controller Blow-out Coils—II—*By C. W. Squier, E.E.* Motor Cars Supplant Horses in Vienna for Drayage—*By Ludwig Spängler.* Points on the Installation and Removal of Pinions—I—*By R. H. Parsons.* Headlight Test at St. Louis. Tests of a 500-hp Diesel Engine at Auburn, N. Y. Transformer Blower of 40,000 Cu. Ft. Capacity per Minute. Improved Change Carrier. Auto-Bus for Houston.

ELECTRIC RAILWAY JOURNAL, March 27, 1915. 12 cols. Ill.

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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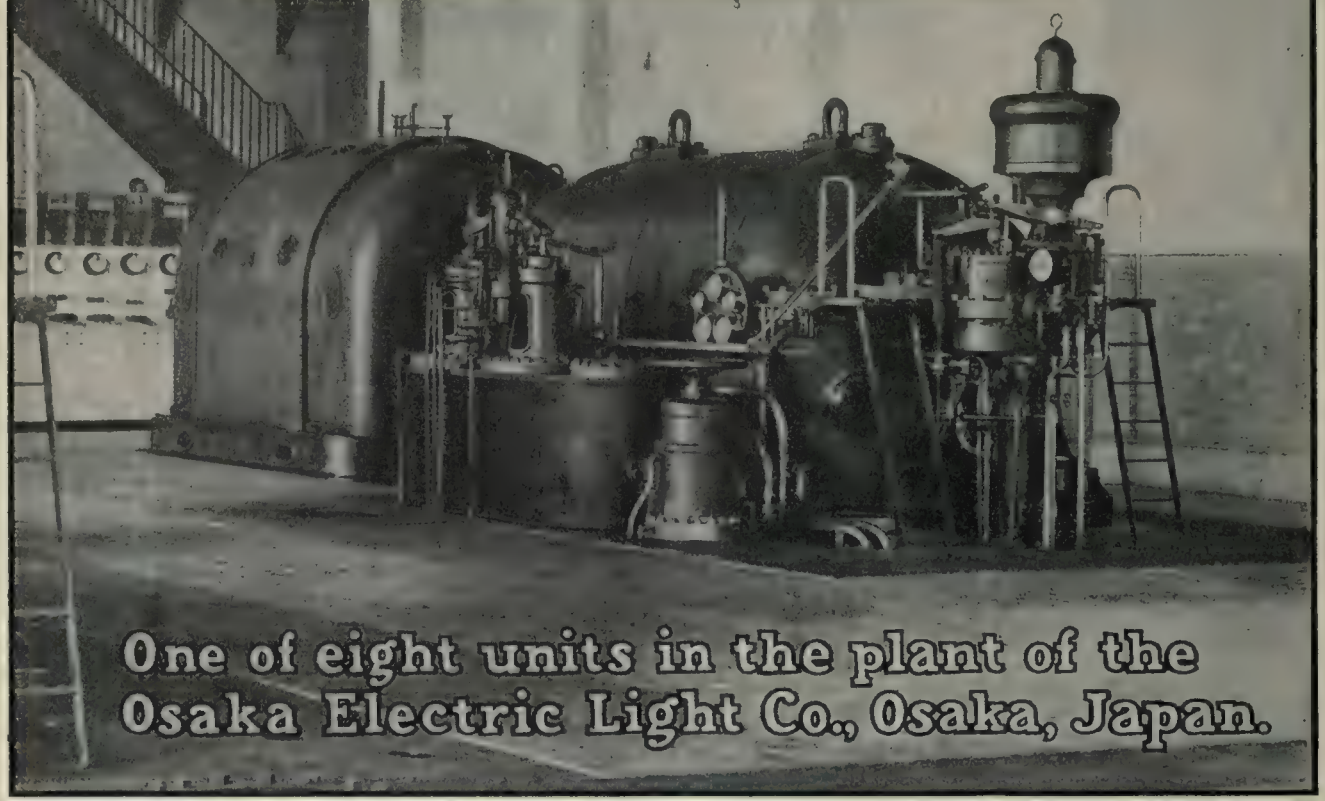
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No back volumes for more than one year, and no back copies for more than three months.

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Turbines

The most progressive power plants in all parts of the world contain Westinghouse equipment.



One of eight units in the plant of the Osaka Electric Light Co., Osaka, Japan.

The Westinghouse Machine Co.
Prime Movers & Auxiliaries
East Pittsburgh, Pennsylvania.

INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

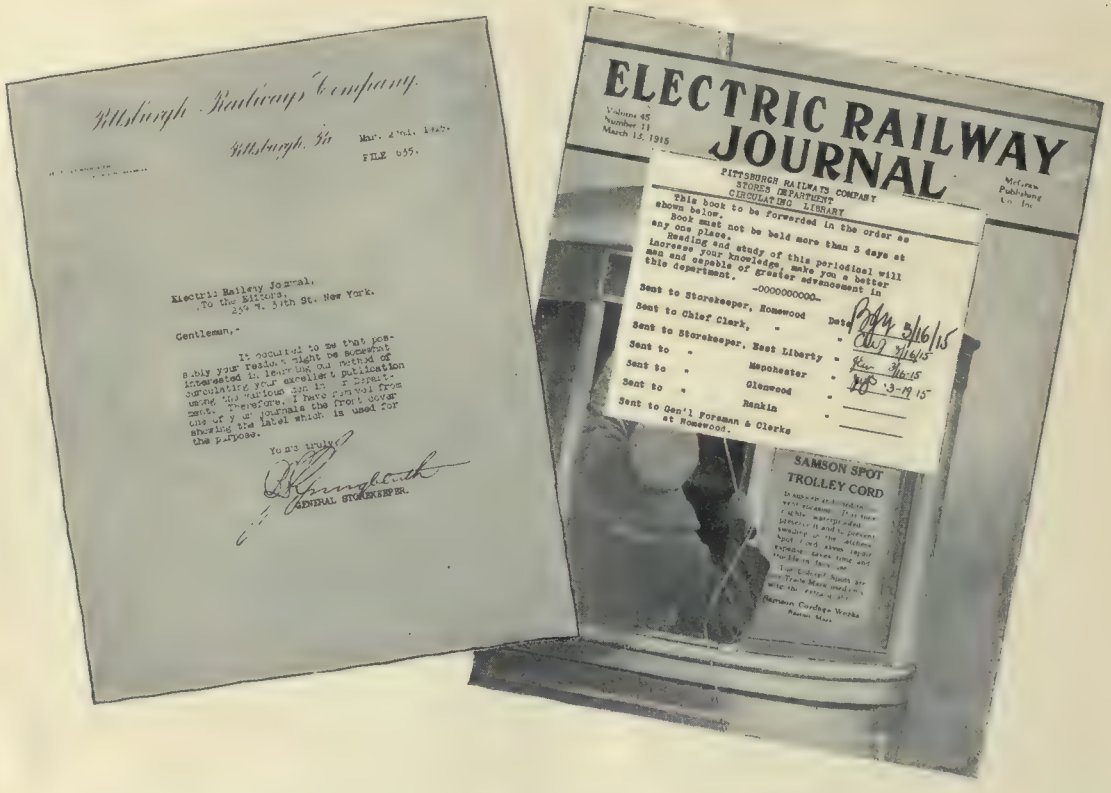
Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building
NEW YORK: City Investing Building
ST. LOUIS: Security Building

PUBLISHER'S PAGE

How to get more efficiency out of every copy your road receives



Is every copy of the Journal, subscribed for by your road, circulated among all the men who ought to read it?

Make the Most of It

and use some method like that of the Pittsburg Railways Co. to increase the knowledge of your men for the benefit of the individual and of the company.

We shall be glad to hear from other roads as to methods they employ to secure maximum circulation for every copy of the Journal which they receive.

Chicago, Milwaukee & St. Paul Railway

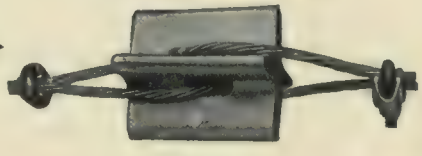
Using large quantities of O-B materials on its new electrification.



O-B Catenary Hangers

Approximately 100,000 have been ordered for use on their catenary lines.

O-B Type X Insulators



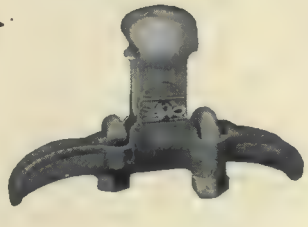
Will be used in connection with the catenary construction. About 66,000 have been ordered.

O-B Suspension Insulators



Are to be used on the transmission lines. The number ordered is approximately 75,000.

O-B Insulator Hardware



O-B Suspension Clamps and Strain Clamps, about 12,000 have been ordered for use with Suspension Insulators.

In addition to the above other catenary materials and many thousands of pin type porcelain insulators.

Quality was a prime consideration in selecting the materials for this important steam road electrification.

The Ohio Brass Co., Mansfield, Ohio

TRACKOLINE

KILLS WEEDS

ONE APPLICATION OF TRACKOLINE MADE EARLY IN THE SPRING WILL DESTROY EVERY VESTIGE OF WEED GROWTH; QUICKLY, POSITIVELY, COMPLETELY. NOTHING WILL BE LEFT FROM WHICH THE PLANT CAN GROW AGAIN THIS SEASON.

THE COST OF TRACKOLINE TREATMENT IS LESS THAN THAT OF ANY OTHER METHOD OF WEEDING PER MILE PER YEAR.

TRACKOLINE WILL GIVE YOU CLEANER TRACK THAN YOU HAVE EVER HAD FOR LESS MONEY THAN YOU HAVE EVER SPENT FOR WEEDING.

WRITE FOR PARTICULARS

KILLS EVERY WEED TOP ROOT & SEED TRACKOLINE

COMMERCIAL CHEMICAL COMPANY
1733 Grand Central Terminal
NEW YORK CITY



6

"Securities which have been issued in accordance with the law as it has been interpreted in the past should be valid obligations on which an electric railway is entitled to a fair return."

—From Code of Principles Adopted by A. E. R. A.

The problem of securing a fair return is successfully solved only by careful management.

One of the elements of success in management is the choice of equipment which reduces costs or increases revenue.

Either of these factors is a good basis for buying.

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Prepayment Car

is unique in this respect and we feel that in developing this car and in constantly improving it we have fully earned the right to charge a very small percentage of the increased returns made possible by our work.

PREPAYMENT CAR SALES COMPANY





Why Not Get Full Efficiency From Your Equipment?

Isn't good service just what you want from your strains? You can't help getting it from

Keystone Porcelain Strains

simply because service depends entirely on the quality of porcelain used.

We found only one grade of porcelain in the whole country good enough for this strain insulator. That grade goes into every one made.

It is hard and tough. Has great resistance to both compression and shear. Has great electrical resistance. The strains are given a heavy brown glaze and are designed with protected end coverings through which the guy wires pass, thus making it impossible for them ever to come into contact with each other.

Made in 2¼, 3, 3½ and 5½-inch lengths.

And for catching your flying trolleys and protecting your overhead, here's what you'll get from

Keystone Trolley Catchers

Positive action; sensitiveness, no rebounding; simplicity, strength; guarantee.

See how sensitiveness and positive action are secured by the centrifugal pawls, the manner in which they are hung and the manner in which they engage with the stops. See how great the rebound would have to be to unlock the catcher and allow the pole to climb.

See the strength of the Keystone; how very few parts it has—only 16; see why it is durable and practically fool-proof.

Then remember that every Keystone is sold under a two years' guarantee.

Why not get full efficiency from your equipment? The use of these specialties will mean much towards that end. Don't you think it would be well to ask us for samples and quotations?

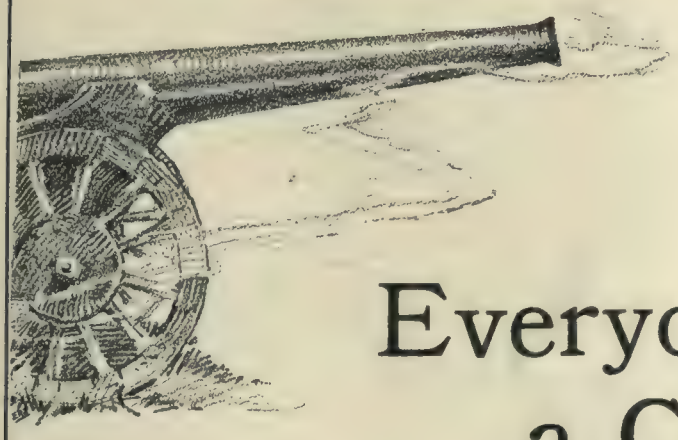
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Manufacturer of Railway Material and Electrical Supplies

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17th and Cambria Sts.

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Hudson Terminal

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417 So. Dearborn St.



Everyone Fears a Cannon

Too much destruction of life and property charged up against it.

And for the same reason can you blame the public for not showing any marked degree of regard for a road which persists in the same kind of work as the cannon?

United States Electric Signals make operation safe —give your road a talking point.

And what is to the point, they save their cost in more economical operation.

We are talking of **United States** Electric Signals.

We have a selling plan whereby you can purchase U. S. Electric Signals on a new basis.

Write us about it.

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West Newton, Mass.

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This emblem stands for fifty years of recognized business stability, for an organization that covers the country with its branches and service stations; and, above all, for assurance of responsibility. Every J-M product is made not merely to sell, but to give service. To assure the permanent satisfaction of every J-M customer and to insure Full Service of every J-M product, this company pledges the whole measure of J-M responsibility.

Whether you are debating as to what type of Conduit to use, or what Fibre Conduit to use we can positively recommend J-M Fibre Conduit as a wise choice.

Made of specially-treated fibre, impregnated with a moisture-proof and preservative compound. Gases, acids or other corrosive elements have no effect on it. Water, gas and even stray currents cannot reach the cables protected by this conduit.

J-M Fibre Conduit is so light that it saves about 80 per cent. in freight and cartage bills. As it is factory aligned, unskilled men lay it quickly and easily, and do not have to use cement and burlap at the joints.

Owing to its remarkable strength, there is practically no breakage either in shipment or in handling. J-M Fibre Conduit has a smooth interior and there is no possibility of a cable sheath being cut.

Write our nearest branch today for booklet.

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WHILE IMMERSED IN WATER EACH BOX IS SUBJECTED TO AN INTERNAL AIR PRESSURE OF 15 LBS. PER SQ. INCH.

Before shipment every "Noark" Subway box must successfully pass this test — the severest ordeal to which cast iron can be subjected.

You will note that not only is the box water-tight from the outside, but is also air-tight from the inside.

Doesn't this argue well for its manhole efficiency; for protection of your feeders, subfeeders and other cables—against seepage and subterranean gases?

When you install "Noark" Subway Boxes you are using a box with a big factor of safety—a box that is electrically and mechanically perfect, from the nuts that hold down the cover to the slate base on which the copper is mounted.

The copper in "Noark" Subway Boxes is ample and well assembled. All contacts are carefully ground. The line is complete, embracing every network and distribution condition.

Write for Catalog.

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Manufacturers of Service, Subway and Transformer Boxes; Fuses; Line Material; Insulating Materials; Fibre Conduit; Fireproof Wood; Friction Tapes; Dry Batteries; Lighting Systems, etc.

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THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver 2582-3040

This Harp



has proved itself superior to any other type in use today

Because

—It provides a better form of contact.
—It eliminates arcing caused by loose axle-pins.
—It affords a rigid bearing for the wheel at all times.
—It reduces chances of dewiring.
—It saves the wheel from shock.
—It enables pins or wheels to be changed quickly.
—It requires no inspection when once properly set.
—It gives longer service itself and contributes to long service in both wheels and overhead.

You will secure every one of these advantages by using the

V-K

NON-ARCING HARP

This harp enables the current to be taken from the wheel right through the bearing—the best and most current saving way. By means of the patented gripping device, peculiar to the "V-K" design, the axle-pin is held and locked securely in the socket. A turn of a nut loosens the pin and permits easy removal when pin or wheel have to be changed. The contact springs of this harp not only serve to improve conductivity, but are designed to act as cushions also, preventing shock and dewirement of the wheel. The tension of these springs is never destroyed by heat.

A condition of economy and efficiency never before possible is obtained by the use of the "V-K" NON-ARCING HARP with the

V-K Oilless Trolley Wheel

The wheel that is absolutely self-lubricating and requires no attention after installation—of the highest conductivity and productive of the least wear upon overhead construction. Made of relatively soft tough metal, cast and finished by a special process which ensures proper balance and eliminates arcing.

You can prove the superiority of these "V-K" designs by any service test. We invite your investigation, correspondence, inquiries.

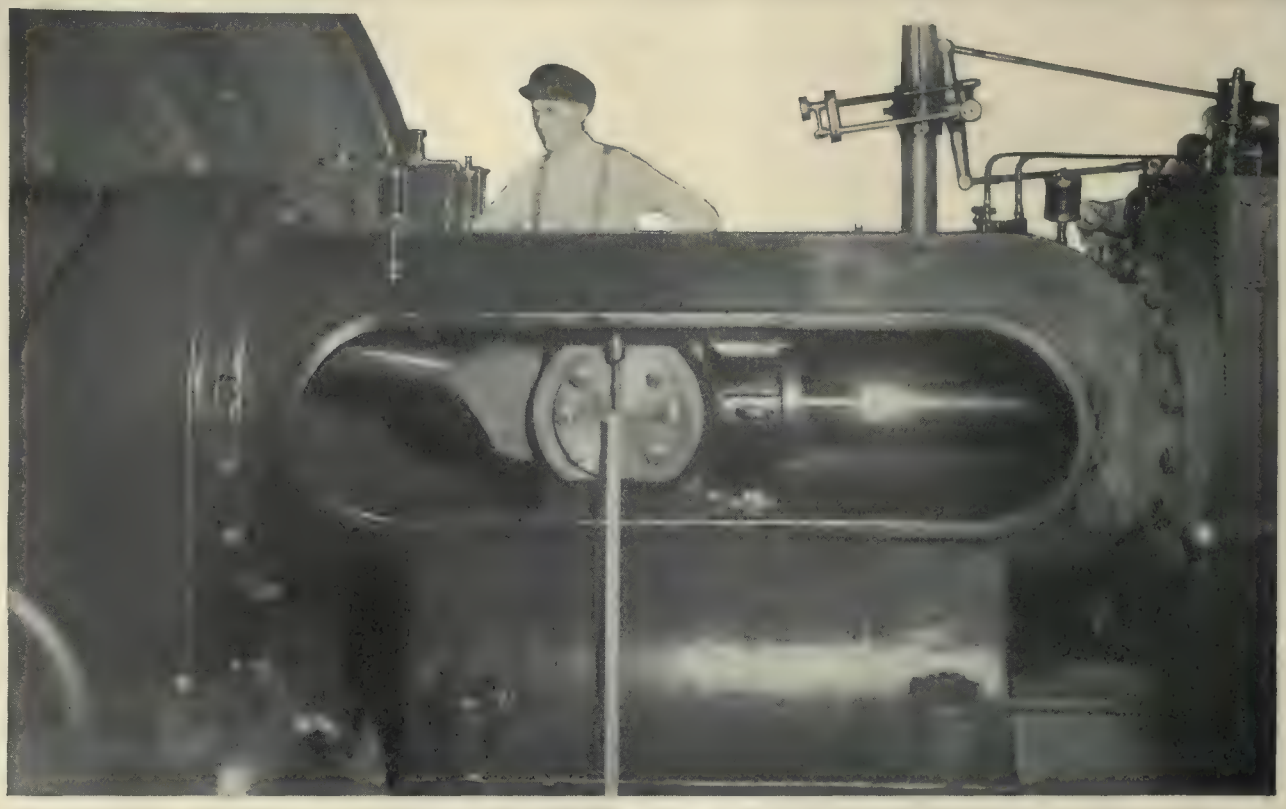
Send for our new illustrated Catalog now on the press. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

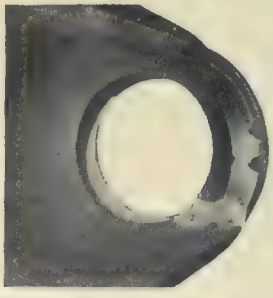
St. Louis, Missouri

Manufacturers of

Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal, and similar products.



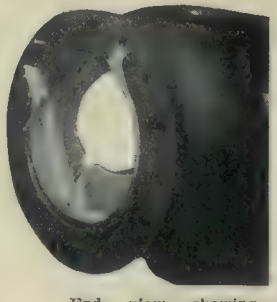
Repaired cross head guide barrel in service.



Showing damaged part before welding

Oxy - Acetylene Welding

proves value in shop repairs



End view showing fracture before repair

Here's just one instance where the saving paid for the necessary welding equipment many times over. These savings are possible in your shop.

The cross-head guide on the high pressure side of a 1200 H. P. Cross Compound Corliss in a large electric railway power plant, cracked in two places.

The part is heavy metal 2¼ inches thick in thinnest portion. Replacement would be very costly, calling for large outlay for new part and expensive delay waiting for its arrival.

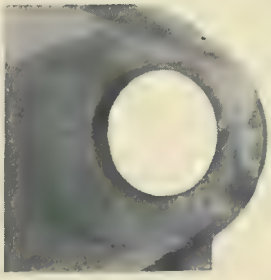
By oxy-acetylene welding this repair was made "on the spot." The cross head guide barrel is good as new. In the shortest possible time this power equipment was put back into service.

In your power plant, you can use oxy-acetylene welding to enormous profit—in your repair shop you can effect repairs possible in no other way.

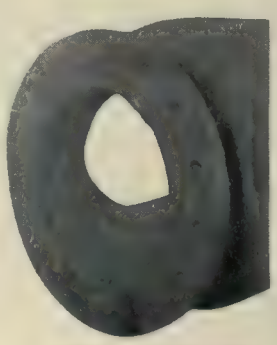
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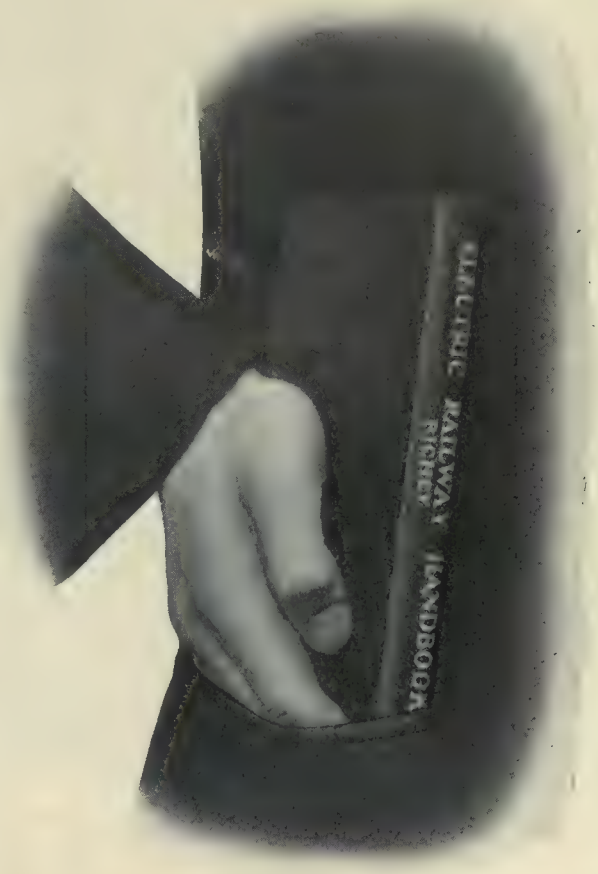
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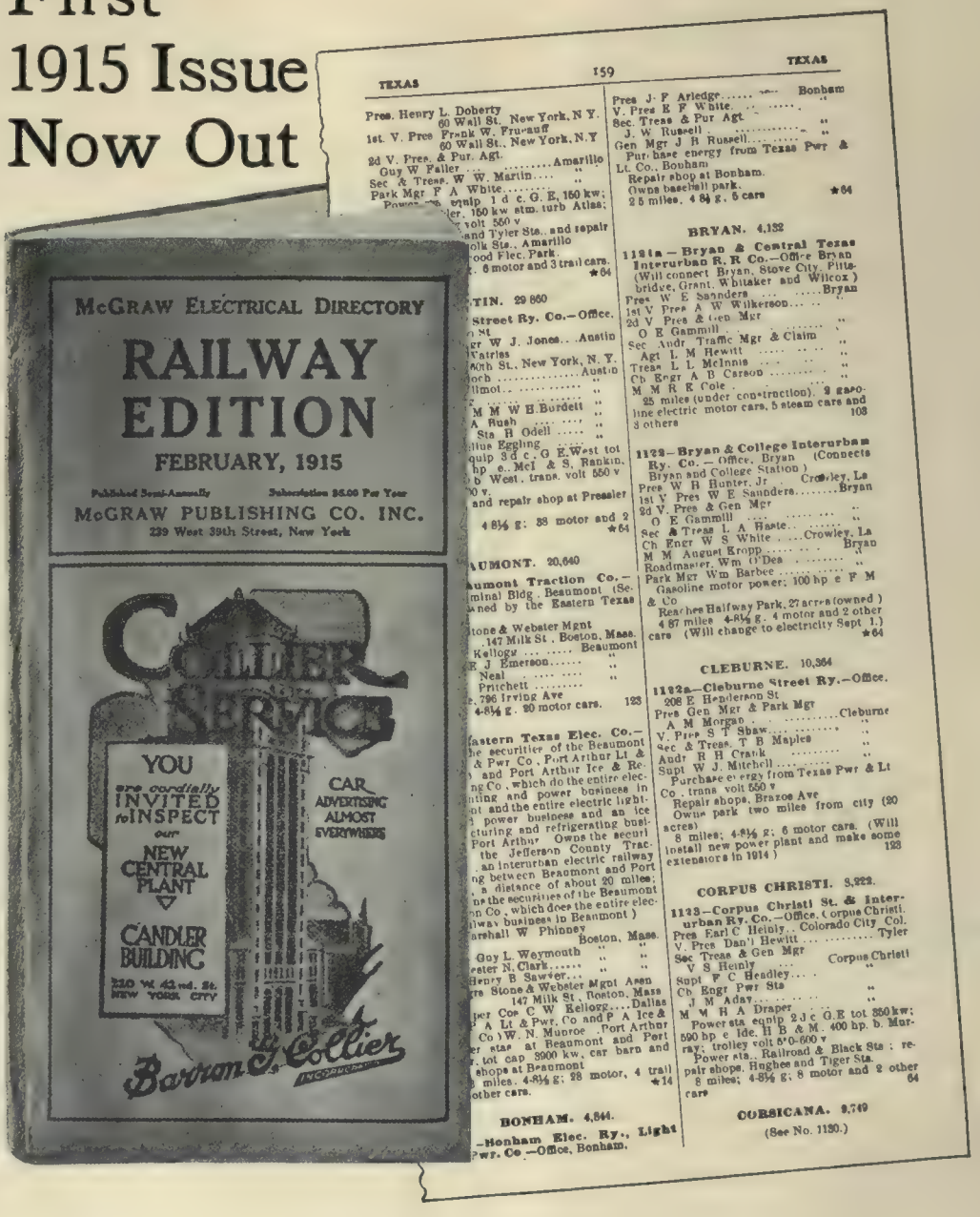
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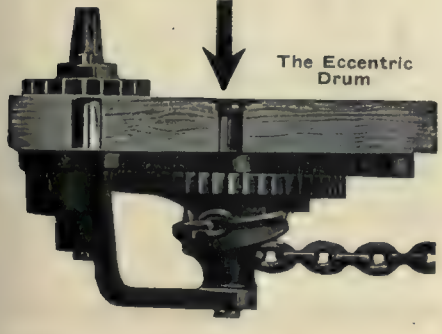
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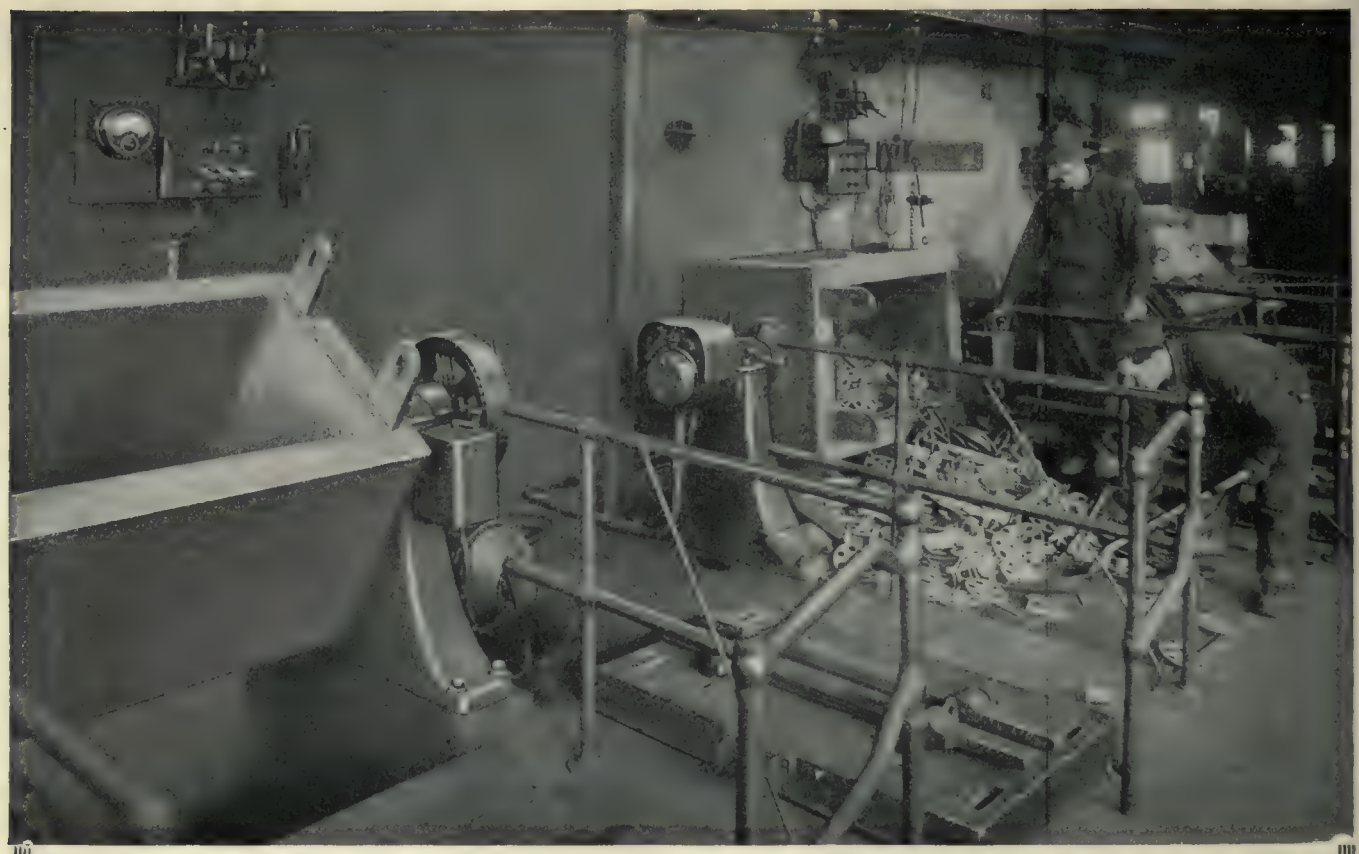
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Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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THE MEANING OF LOW REPAIR COSTS

Although we have come to regard locomotive maintenance costs only as incidental to electrification problems, the record of the New York Central's equipment, published in last week's issue, possesses from one angle a very considerable degree of importance to those interested in the electrification of steam railroads. The units in question have been kept in repair during the past eight years at a figure that has remained consistently close to 3½ cents per locomotive-mile, and although this fact does not prove that all electric locomotives in the country will be maintained at the same rate of expense, it does show what can be done. The low cost is, obviously, the result of skilful management on the part of the New York Central's equipment-maintenance department, this being shown in the road's maintenance cost of some 1.9 cents per car-mile for its multiple-unit cars, but since good management certainly ought to be available on any line similar results can hardly be considered impossible of duplication elsewhere. Upon the assumption that this is the case, a somewhat surprising conclusion develops. An electric locomotive that costs 3½ cents for repairs saves just about 10 cents per mile over the repair cost of the steam locomotive that it displaces. This saving alone, even when based upon a low annual mileage of 36,000, will pay 8 per cent interest on the cost of the electric unit, and inasmuch as twice this mileage is possible, the high first cost of the electric locomotive ceases to be of import under high-grade supervision.

THE AUTO-BUS EIGHTY YEARS AGO

The present "jitney" bus agitation has undoubtedly brought to the minds of students of transportation history the fact that the automobile is about a century old and that more than eighty years ago it was, in England, a potentially formidable rival of the then well-established and profitable stage-coach lines. The condition of the roads in this country was not favorable to either mode of transportation at that time. The steam carriage was brought to a remarkable state of perfection for the time, and its operation was satisfactory to the passengers, as indicated by liberal patronage. London was the center of the new industry, and the London & Greenwich Steam Carriage Company had good equipment and an opportunity to build up an interurban, and possibly an urban, business. The only difficulty was to make any profits, the same difficulty which is confronting the "jitney" to-day, although the promoters are blinding themselves to the facts. If the rapid development of the steam railroad had not modified the situation, the steam road carriage might have become a real competitor of the stage coach. As a matter of fact, however, even the stage coach had to take to rails eventually and was restricted to the urban field by economic considerations. Transportation history has proved that the economical and safe wholesale movement of passengers and freight requires the use of rails, large vehicles and operators who are skilled in all the various branches of railroading, and history has a habit of repeating itself.

EXAMPLE OF ASSOCIATION ACTIVITY

The report of the committee on the operation of motor vehicles, published elsewhere in this issue, is a good example of the interim work which an association is capable of doing. Many people not familiar with the work done at the New York office of the association imagine that it is confined mostly to compiling the reports of the previous convention and preparing for the next; in other words, that to hold a convention is the chief purpose of the association. Actually, it is the expression only of the work, and in some respects of only a part of the work, done during the year. In this connection it is illuminating to compare the activities of the association now and ten years ago, when it was reorganized. At that time the convention was practically the only association event of the year, and in 1905 two volumes only were required to report the meeting of the association. Now there are six volumes, an engineering manual, a monthly magazine, bureaus of information, fare research and identification of claimants, and many other activities. Yet up to last October, when a slight increase was made, there had been no change in the dues since 1905. It is idle to say that the needs of the industry have not grown enormously during this period and now require a larger general staff to direct the united work which must be undertaken. Much of the work of an association cannot be planned a year in advance. Who could have foretold, for instance, last October, of the development of the "jitney" bus situation? Without a permanent organization little could have been done until next October, but with the present organization a group of prominent operating men have been brought together to study the situation and have been able to issue their conclusions with a statistical report on the subject prepared by the bureau of fare research. We believe that this work will be appreciated by the membership at large. It is also evidence to companies which are not now affiliated with the association of the value of membership.

LIGHT ON THE BUS SITUATION

In brief, the conclusion reached by the committee on motor vehicles in its report on the "jitney" bus is that a thorough illumination of the whole subject is the one vital necessity. No other solution of the problem is emphasized in the report, which is published elsewhere in this issue, and in view of the committee's strongly-expressed belief in the temporary character of most of the "jitney" bus competition, no more immediately satisfactory plan is apparent. By this time, of course, it is well established in the minds of electric railway operators that the motor-driven vehicle cannot handle traffic as cheaply as the surface car. And it is also well established that, notwithstanding the futility of regulated "jitney" operation, the unregulated "jitney" continues to operate and even can make money over sufficiently short, heavily-traveled routes, so that if it is encouraged by a community through neglect of legal restrictions the inevitable result will be the economic waste incident to the artificial maintenance of inefficiency.

Unfortunately, the public at large has not yet grasped this fact. The "jitney" bus offers high speed, and in some cases it offers, as well, the convenience of stopping at the doors of its patrons' homes. From the viewpoint of the individual, there are opposed to these definite advantages only the minor visible objections of discomfort and risk of accident, together with the nebulous assertion that the effect on the railway company of the continuance of the "jitney" will eventually be to drive the fare up or the service down throughout the outlying sections of the city. As the "jitney" patrons are, in general, limited to the residents of, say, a 2-mile zone about the business district, they are naturally inclined to let the other fellow do the worrying about what is going to happen in the suburbs.

Obviously, this does not alter the fact that the public at large has an immediate and very direct concern in the matter. The public at large will pay the bills in the end, and it is entitled to an unobscured view of the goal toward which the bus fallacy may lead it. There is certainly wide opportunity for the dissemination of information on the subject. This is exemplified by the situation in Chicago, where the suggestion in the City Council to use the city's 55 per cent share in the net receipts of the surface traction lines for establishing competitive buses has resulted in an investigation of the profits accruing from the proposed enterprise. The inquiry was conducted by the Commissioner of Public Service, and he has prepared a glowing report in favor of the project which will, no doubt, influence the minds of many of Chicago's citizens regardless of the fact that it is fairly reeking with errors.

To be specific: In the report a suggested route to Hegewisch, the suburb made famous by the real-estate ventures of one Battling Nelson, is among those selected for analysis. This calls for a 7-mile run for a thirty-passenger bus with an assumed load factor of 70. As the report does not contemplate that the buses will do a pickup business these premises correspond to an average of twenty-one passengers per trip or three passengers per bus-mile, producing gross receipts of 15 cents per mile, while the report admits the bus would cost 26 cents per mile to operate. The figure of three passengers per bus-mile is certainly a liberal allowance in view of the fact that the Fifth Avenue buses in New York, with their high average seating capacity of thirty-eight and with undoubtedly more short-haul traffic than on the line proposed in Chicago, carry only 3.86 passengers per bus-mile. Nevertheless, the Commissioner of Public Service, by a peculiar process of reasoning and seeming confusion of "seats per single trip" and "seats per round trip," finally reaches the conclusion that the twelve buses on the route in question would earn annual profits of more than $17,000. On another page he states that a 14-mile north and south route across the city of Chicago is good for receipts that are equivalent to 6.2 passengers per bus-mile, although twenty-six-passenger buses are to be used.

Again, in the same report there is published a table of data on the 3-cent, crosstown bus line in the city of Detroit. In this the number of passengers per bus-mile is actually stated to be five, allowing 35 per cent of standees, while immediately following this is an item showing the direct cost of operation alone to be 27 cents per bus-mile. According to our method of calculation, five passengers at 5 cents each would bring in only 25 cents per bus-mile and would net nothing but a deficit. Yet the Detroit authorities are quoted as stating in all seriousness: "Were we to charge a 5-cent fare we would readily lay aside a nice sum annually!" If this is the material with which the citizens of Chicago and Detroit are fed by their local officials can they be blamed for believing that the "jitney" is a gold mine?

Would it not be well to begin by supplying city engineers, who may be in position to influence public opinion, with some of the elementary data and methods used in transportation problems? At the present time, a perfect flood of glaringly inaccurate reports on bus operation is submerging the fact, and electric railway men alone are equipped with the experience necessary to dam it.

As we have explained before, the only conditions under which automobile service for a 5-cent fare can be made economically successful are on very short runs with large traffic, but even here electric cars can carry passengers much more cheaply than the bus. If the latter is to be permitted, the only recourse for the railway companies, as pointed out in the report of the bureau of fare research, is to go to a zone system and beat the "jitney" out in its own field. However, a campaign of publicity which can be based upon such definite facts as exist in the case of the "jitney" can hardly fail to result in the application of restrictive measures so that such a drastic remedy may not be needed. Most of the "jitney's" freedom at present seems to be due to a belief that it is a highly valuable infant industry and needs pampering. If this belief is dissipated regula-

tion should follow at once as a matter of course, and, in general, the "jitney" is not able to survive regulation.

BUSINESS CONDITIONS AND REGULATION

The annual report of the American Telephone & Telegraph Company is usually a most interesting corporation document. This year, however, it surpasses all previous records by virtue of its being an index of general business conditions in the United States and an authoritative commentary upon the success and needs of public utility regulation.

Theodore N. Vail, president of the company, believes that the basic conditions of this country never were better for the restoration and continuance of normal conditions, and to his mind the correction is simple. Of the three principal creative divisions of industrial enterprises—producers from the earth, manufacturers, and transportation and intercommunicating companies —Mr. Vail looks upon the last as the most important in their creative effect. Upon these industries depend all interchange and movement; their relative economic importance is many times their relative capital, and any cause that disturbs them disturbs the two other classes as well, both industrially and financially. As a corrective measure, therefore, it is necessary to make the securities of such companies, particularly the transportation lines, so attractive that they can secure from investors the $1,000,000,000 a year needed by the country as a "going" and a "growing" concern. If this were done, the normal conditions of employment, ability to purchase, production and prosperity would soon be restored.

Mr. Vail is a keen and experienced observer of American conditions, and his recognition of the importance of transportation prosperity is forceful. This point comes out, too, in connection with his remarks on regulation. To his mind, regulation and control by commissions and business courts have become a permanent feature of our economic life. Regulation must not be too drastic, however, or interfere too much with operation. During the last few years the disturbance, uncertainty and timidity about transportation caused by legislative requirements and increased wages without corresponding revenue increases have caused a jump in operating expenses which can no longer be met by a reduction in such expenses or by scientific methods. The fact is that the same ratio of progress that was brought about by the introduction and application of the principles of scientific management cannot be permanently maintained, and when this fact is coupled with increasingly onerous legislative and regulatory burdens, it is easy to see, as Mr. Vail says, that an irreducible minimum in unit expenses has just about been reached.

As we have before stated in these columns, there have been a few evidences in the last few months that some commissions are beginning to realize that bankrupt public service companies mean stunted communities and that utilities cannot expand and develop without additional capital. Funds for further investment, however, will not be proffered in the desired abundance until better returns are in sight than at present. Investors must be reassured against commission severity, and the best way to accomplish this is to bring the general public to a fuller realization that the problems which are before public service commissions are far more vital to our national prosperity than questions before even the highest courts.

MAILING COMMUNICATIONS WITH DIVIDENDS

With the quarterly or semi-annual distribution of dividends an electric railway company has an opportunity often overlooked to communicate to its stockholders information, advice or suggestions bearing upon the welfare of the property. There is no reason why such communications should so generally be confined to annual reports, and as the importance of taking an interest in the public relations of a utility becomes more generally realized by security holders, an increase may be expected in the practice of addressing stockholders and bondholders several times a year if need be, in connection with matters where public sentiment has much influence.

Thus the latest dividend checks of the Pennsylvania Railroad Company, mailed a few days ago, were accompanied by printed slips calling the attention of stockholders to the efforts the management is making to obtain the repeal of the so-called full crew laws of the states of Pennsylvania and New Jersey. The statements point out that the campaign is being made to uphold the interests of the stockholders, of railroad workers as a body and of the public, all of which are unfairly attacked by the full crew laws. The stockholder, it is urged, has a vital interest in the repeal of these laws, and the slips conclude with the request that each stockholder do all that he or she can to interest friends, community and state in securing the removal of this legislation from the statute books.

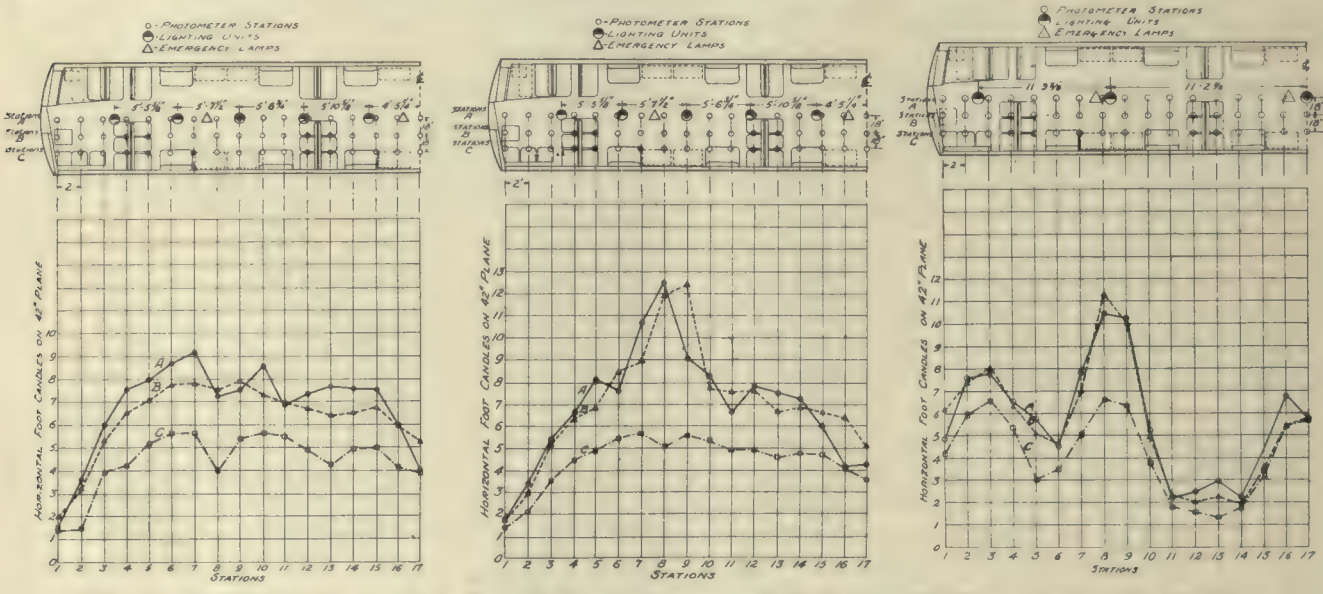
This practice can be applied in the electric railway field on occasions which will readily occur to executive officers. Among them might be cited forthcoming or pending rate proceedings before state commissions, applications for legislation freeing companies from various burdens of excessive taxation, such as severe requirements in connection with the replacement of highway structures after track construction is carried through, or the repeal of ordinances relating to paving, drainage and other matters of like import, so far as they affect local stockholders. In many of these cases a partial mailing list will be sufficient. Such procedure does not mean that the directors and executive officers of a company are not doing their full share of company management, but it may on occasion afford a useful means of stimulating public opinion along proper lines of action, and at much smaller cost than where circularization has to be independently conducted through the mails. Even the postage on a message to several thousand stockholders is worth saving, if it can be effected by a little foresight along the lines above indicated.

The New York Municipal Car—The Lighting*

Many Lighting Combinations Were Tried in a Full-Size Template Car, Resulting in the Choice of Fifteen 56-Watt Bowl Frosted Tungsten Lamps along the Car Center Line, Besides Emergency Lamps

BY W. G. GOVE, ENGINEER OF CAR EQUIPMENT NEW YORK MUNICIPAL RAILWAY CORPORATION, AND L. C. PORTER, EDISON LAMP WORKS, GENERAL ELECTRIC COMPANY, HARRISON, N. J.

Not the least of the advanced equipment of the New York Municipal car is its lighting. Many new problems had to be solved to meet satisfactorily the following desiderata: (1) Quantity of light; it is desirable to have an average intensity of not less than 3 foot-candles on a horizontal plane 42 in. above the floor, at 85 per cent normal voltage. (2) General effect and appearance of lighting system with lamps lighted or extinguished. (3) Lack of eyestrain for both seated and standing passengers, involving not only intensity and direction of light, but also glare and possible shadows thrown by standing passengers on the reading matter of seated passengers. (4) Efficiency. (5) Installation and maintenance expense. (6) Depreciation of equipment in service.



NEW YORK MUNICIPAL CAR—FIGS. 1, 2, AND 3—CHARTS SHOWING DISTRIBUTION OF LIGHT AND EFFECTIVE ILLUMINATION

Fig. 1 shows ten 56-watt, 120-volt tungsten filament lamps in glass reflectors, and four 10-watt, 115-volt tungsten emergency lamps with same reflector. Fig. 2 shows ten 56-watt, 120-volt tungsten lamps in prismatic reflectors and four 10-watt, 115-volt tungsten emergency lamps in prismatic reflectors. Fig. 3 shows five 94-watt, 120-volt tungsten lamps in prismatic reflectors and four 10-watt, 120-volt emergency lamps in prismatic reflectors.

To study these problems tests were conducted in a full-sized model car. This car was 67 ft. 3 in. over all, 9 ft. 10 in. wide and 12 ft. 3 in. high. The interior dimensions were 65 ft. long and 9 ft. wide. The interior finish was white enameled headlining and walls down to the window sills. Below the sills the walls were painted gray. The floor was concrete and the seats were upholstered in yellow rattan.

Photometer tests were taken to supplement such data as observation of the general appearance, installation and maintenance cost figures, etc. The photometric measurements were not made to compare the efficiency of any particular types of illuminating devices or accessories thereto, though the average intensities obtained were used in securing the relative utilization efficiencies.

In making the photometer tests stations were chosen 2 ft. apart in a horizontal plane 42 in. above the car floor, over one-fourth of the floor area. The entire car, however, was equipped with lighting units. Five readings were taken at each station, on a portable photometer, recalibrated before each test. To make one reading comparable with any other, simultaneous voltage readings were taken, as constant voltage was found to be impracticable. Each photometer reading was corrected to normal voltage from the characteristic curves of the lamp and the five corrected readings averaged to obtain the station value. In obtaining the average intensity for the entire car, weight was given the stations in proportion to the area covered. The illumination values were also calculated for 85 per cent normal voltage. The same lamps, as far as practicable, were used in the various reflector equipments.

It was decided before the tests started that tungsten filament lamps would be used for illuminants, the question being what was the best method of applying the lamps. Three systems of illumination were tried out, namely, direct lighting, semi-indirect lighting and totally indirect lighting. To carry on the tests the interior construction of the car was altered when this was necessary.

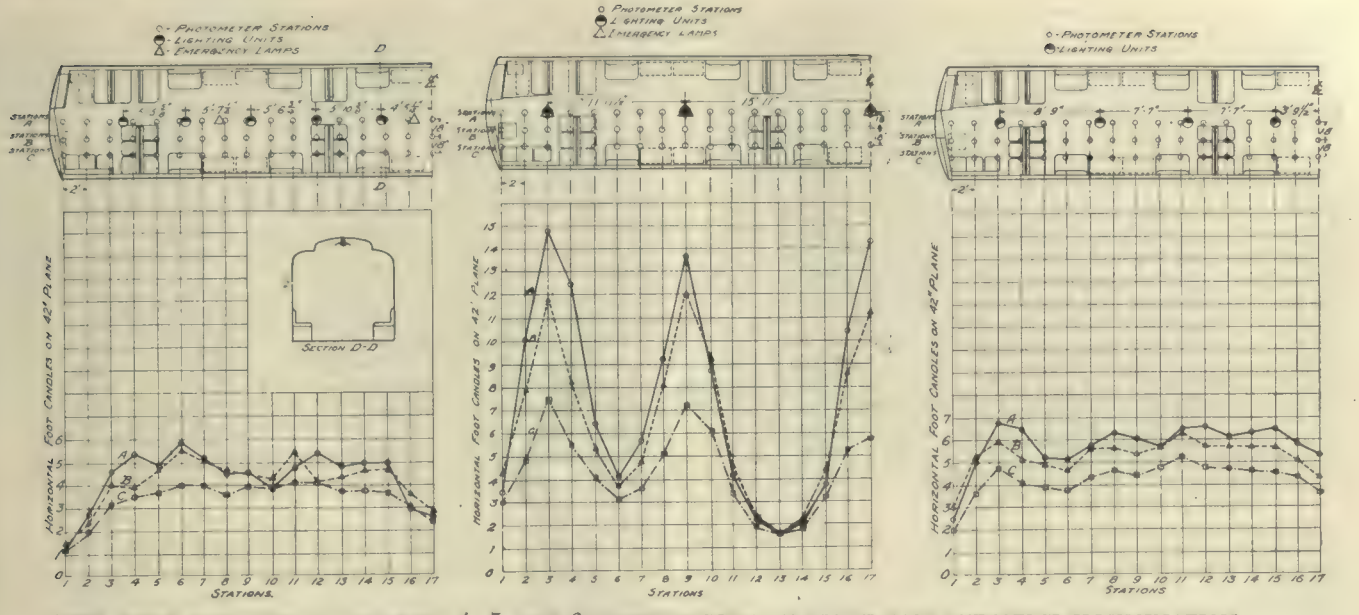
Photographs of the interior of the car were taken with the lamps burning. The exposures were timed to exactly two minutes. These photographs have no bearing on the photometric readings, except to indicate in a comparative way the high and low lighting throughout the car.

Direct Lighting Tests

The direct lighting tests made were as follows:

No. 1.—The lighting units consisted of a single row of fourteen 6-in. opal glass reflectors (Fig. 9) mounted along the center line of the ceiling and spaced as shown

*Abstract of a paper entitled "A Practical Study of Car Lighting Problems," read at a meeting of the New York Section of the Illuminating Engineering Society, March 11, 1915.

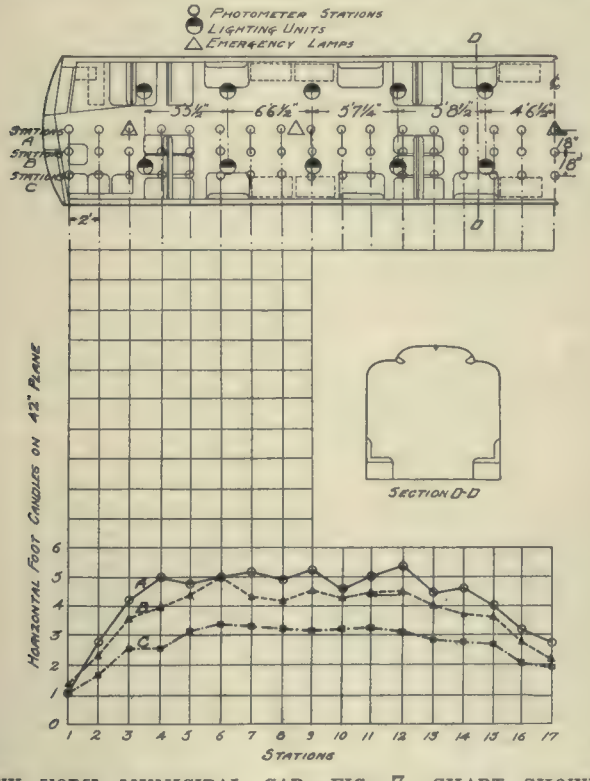


NEW YORK MUNICIPAL CAR—FIGS. 4, 5 AND 6—DISTRIBUTION OF LIGHT AND EFFECTIVE ILLUMINATION

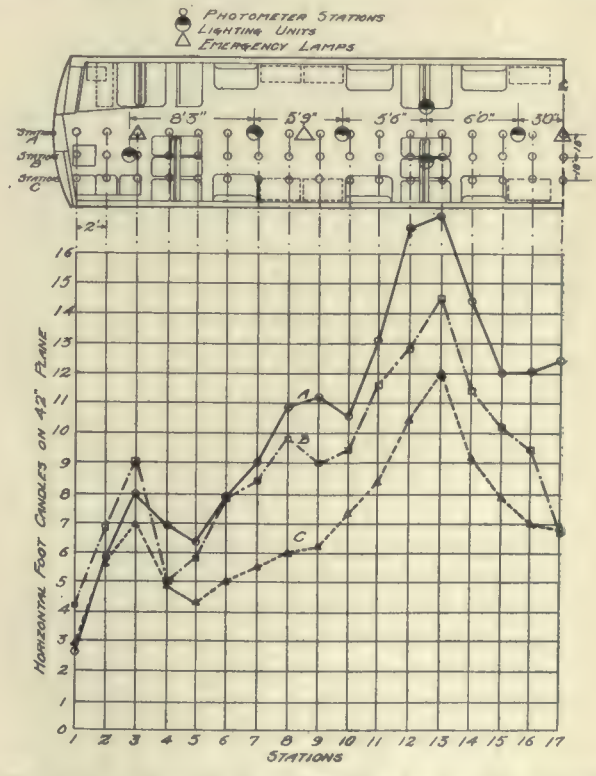
Fig. 4 shows an installation of indirect reflectors set in coves, ten on each side of car, and five 10-watt frosted emergency lamps along center line of car, set in ceiling rosettes. Fig. 5 shows a semi-indirect installation of two 94-watt (horizontal) lamps and one 10-watt (vertical) lamp for each of five units. Fig. 6 shows an indirect installation comprising eight white enameled steel indirect reflectors with three 36-watt, 115-volt lamps per unit.

in Fig. 1. Ten reflectors were equipped with 56-watt clear bulb tungsten lamps and four with 10-watt clear bulb tungsten emergency lamps. The light distribution, Fig. 1, was good, though it had points of high intensity under the emergency lamps, due to the small lamp in the large reflector. No bare lamp filaments were visible along the normal line of vision. The efficiency of the system was high, installation costs—on account of the single row of large units—were low, and maintenance was good, the smooth surface of the reflectors facilitating rapid cleaning. The general appearance in the car was pleasing (Fig. 15) and the illumination good, averaging 5.7 foot-candles at normal and 3.2 at 85 per cent voltage, with an energy consumption of 1.03 watts per square foot. There were 5.54 effective lumens per watt and the effective utilization efficiency was 68.7 per cent. The utilization efficiency in an ordinary dark yellow car with similar equipment is about 30 per cent, showing the great advantage of the white enamel interior finish.

No. 2.—The second test, Fig. 2, was similar to the first, except that clear prismatic reflectors were used. The change of reflectors raised the average foot-candle intensity to 6.1 at normal and 3.4 at 85 per cent voltage. The effective lumens per watt were increased to 5.90 and the utilization efficiency to 73.2 per cent. Maintenance would be slightly higher, due to cleaning the prismatic glass. There was also a little more glare, though not an objectionable amount.



NEW YORK MUNICIPAL CAR—FIG. 7—CHART SHOWING DISTRIBUTION WITH COVE LIGHTING (SEE FIG. 17)



NEW YORK MUNICIPAL CAR—FIG. 8—CHART SHOWING DISTRIBUTION WITH LIGHTS ON GRAB RAILS (SEE FIG. 18)



NEW YORK MUNICIPAL CAR—FIGS. 9, 10 AND 11—ARRANGEMENTS AND TYPE OF LIGHTS

Fig. 9 shows 56-watt tungsten lamps in white glass reflectors. Fig. 10 shows 56-watt lamps with reflector board below ceiling. Fig. 11 shows 80-watt turnip-shaped lamps.

No. 3.—In the third test five 94-watt clear tungsten filament lamps, equipped with clear prismatic reflectors, were located in a single row down the center line of the ceiling. Four 10-watt tungsten emergency lamps in clear prismatic reflectors were located between these. The resultant average intensity in the car body was good, but due to the relatively low hanging height and wide spacing of the units the distribution was very uneven (Fig. 3). The installation and maintenance of the system would be low, on account of the small number of large units to install and clean. The average foot-candles obtained were 5.0 at normal and 2.8 at 85 per cent voltage. The energy consumption was 0.87 watt per square foot; the effective lumens per watt were 5.75; and the effective utilization efficiency was 71.5 per cent.

Semi-Indirect Lighting Tests

No. 1.—A very interesting method of lighting was used in the first semi-indirect lighting test. Twelve special 80-watt 95-volt turnip-shaped tungsten lamps, opal-dipped over the tip half, were installed down the center line of the ceiling. Each lamp was suspended by an inverted white enameled cone, shown in Fig. 11. Three 10-watt tungsten emergency lamps were also used in small rosettes. The 80-watt lamps were connected six in series. All of the filament of the 80-watt lamps was located below the center of the bulb; hence, none of it was in the line of vision. The opal on the lower half of the bulb served to protect the passengers' eyes from the glare of the bare filament and to reflect the light up to the ceiling. This system eliminated reflectors, special holders and other accessory equipment, thus lowering both installation and maintenance costs. The average intensity was 7.7 foot-candles at normal and 5.1 at 85 per cent voltage. The energy consumption was 1.69 watts per square foot, the effective lumens per watt 4.65 and the utilization efficiency 58.4 per cent.

No. 2.—In the second semi-indirect lighting test a novel equipment was used (Fig. 10). Ten 56-watt clear tungsten lamps were located on the center line of the ceiling, supplemented by four 10-watt tungsten emergency lamps. At 6 in. below the ceiling, and extending the entire length of the car, was suspended a reflector consisting of a white enameled board 11 in. wide, convex on a 16-in. radius. The bowls of the 56-watt lamps extended through holes cut in this reflector. Under each hole was fastened a white glass dish to diffuse the glare of the bare filament. The plan was to utilize as much as possible of the direct light from the lamp, to illuminate the advertising signs; the indirect light to give even distribution and the direct light to brighten up the under side of the reflectors. The light distribution was good, but the intensity low, averaging 3.9 foot-candles at normal and 2.2 at 85 per cent voltage. The watts per square foot were 1.03, effective lumens per watt 3.81, and the effective utilization efficiency was 47.2 per cent. The illumination was pleasant, but the appearance of the lighting equipment was rather crude, suggesting a watering trough down the center of the car. While both sides of the reflector and the ceiling were painted alike, the under side of the reflector appeared gray, due to the lower intensity of light on it. Another test with the interior finish silver gray instead of white lowered the efficiency about 10 per cent.

The next semi-indirect equipment tested consisted of ten 94-watt tungsten lamps equipped with five 13-in. glass bowls, mounted down the center line of the ceiling.

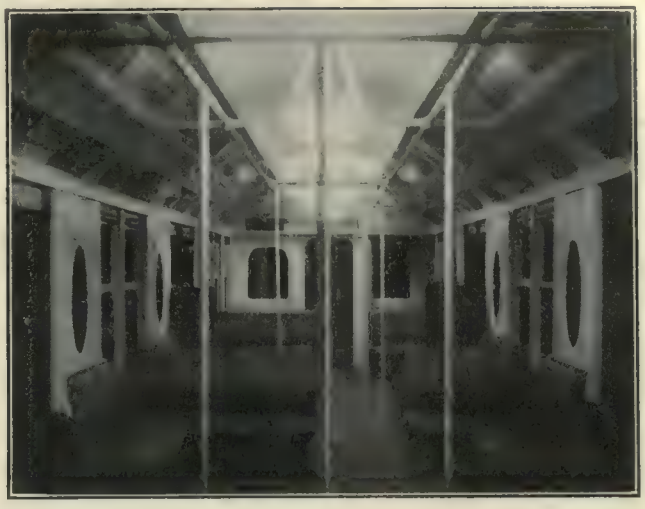


NEW YORK MUNICIPAL CAR—FIGS. 12, 13 AND 14—ARRANGEMENTS AND TYPE OF LIGHTS

Fig. 12 shows an indirect fixture with three 36-watt tungsten lamps (see Fig. 6). Fig. 13 shows semi-indirect lighting with two 94-watt and one 10-watt lamp per bowl. Fig. 14 shows tungsten lamps and special curved white glass screens.



NEW YORK MUNICIPAL CAR—FIG. 15—LIGHTING EFFECT OF INSTALLATION SHOWN IN FIGS. 1 AND 9



NEW YORK MUNICIPAL CAR—FIG. 16—SEMI-INDIRECT LIGHTING WITH SPECIAL CEILING INSERTS

There were two 94-watt lamps and one 10-watt emergency lamp in each bowl. The bowls were hinged to allow lowering for cleaning and lamp replacement. The bowls were suspended with their tops located 12 in. below the center of the ceiling. The illumination from this system was very uneven, being high directly under the units and low between them (Fig. 5). The average intensity was 5.7 and 3.2 foot-candles at normal and 85 per cent voltage respectively; watts per square foot 1.69, effective lumens per watt 3.36, and effective utilization efficiency 41.5 per cent.

To determine the effect of the shape of the ceiling on the light distribution, a special headlining consisting of a white enameled insert, having a 3-ft. span on an 18-in. radius, was inserted and the test repeated (Fig. 16). This raised the average foot-candles to 6.1 and 3.4 at normal and 85 per cent voltage respectively, effective lumens per watt to 3.62, and the utilization efficiency to 44.7 per cent.

The insert was then removed and the test repeated with a different spacing of the units. This resulted in a little improvement in distribution. The principal trouble was that the car headroom was not sufficient to allow the lighting units to be hung the proper distance below the ceiling.

The next equipment tested required special reflecting devices. Ten 56-watt clear tungsten lamps were located in a single line down the center of the ceiling, with five 10-watt all-frosted emergency lamps in rosettes between them. Each 56-watt lamp was equipped with a screen made from a circular piece of glass bent over a cylinder (Fig. 14). This gave a screen 11 in. long x 8 in. wide x 3 in. deep. When these screens were hung beneath the lamps with their open ends toward the side of the car, it was possible to see the lamp filaments from any part of the passenger car body; at the same time the direct light from a considerable portion of the lamp fell on the ceiling and reached the reading plane with but one reflection, making the system fairly efficient. The distribution lengthwise of the car was even, though the outboard seats received considerably less light than the center aisle of the car. The average intensity was 4.8 and 2.7 foot-candles at normal and 85 per cent voltage, the energy consumption 1.04 watts per square foot, effective lumens per watt 4.63, and effective utilization 57.6 per cent. The chief advantage of this equipment was the ease with which the reflectors could be cleaned.

TOTALLY INDIRECT TESTS

No. 1.—The first totally indirect equipment tried consisted of eight special indirect fixtures, these being white porcelain enameled on steel, 15½ in. in diameter and 5½ in. deep. Each fixture contained three 36-watt tungsten lamps mounted vertically. The fixtures were hung in a single row down the center line of the ceiling, the tops of the reflectors being 13 in. below the ceiling. The spacing of the units is shown on Fig. 6. The resultant illumination was uniform and of fairly good intensity, averaging 5.1 and 3.2 foot-candles at normal and 85 per cent voltage, for an energy consumption of



NEW YORK MUNICIPAL CAR—FIG. 17—INDIRECT LIGHTING WITH REFLECTORS SET IN COVES, TEN ON EACH SIDE.



NEW YORK MUNICIPAL CAR—FIG. 18—INDIRECT LIGHTING FROM UNITS ON GRAB RAILS

1.47 watts per square foot. The effective lumens per watt were 3.43 and the effective utilization efficiency was 46.3 per cent. The chief drawback of these fixtures was their liability to catch and collect much dirt, thus materially reducing their efficiency; also to obtain good distribution it was necessary to hang them so low that they might be in the way of tall passengers.

No. 2.—To get away from a low fixture in the center line of the car, the next equipment tested consisted of twenty 36-watt tungsten lamps in indirect reflectors. These were mounted in two rows of ten each on the sides of the car, just above the deck sill between the ventilators, as shown in Fig. 17. Five 10-watt frosted lamps in rosettes were mounted on the ceiling for emergency lights. The 36-watt lamps were mounted horizontally with their centers 7 ft. 4 in. above the floor. The spacing of the lighting units and the distribution therefrom is shown in Fig. 7. The resultant illumination was of low intensity, averaging 3.5 and 2.2 foot-candles at normal and 85 per cent voltage. The wattage consumption was 1.32 per square foot, effective lumens per watt were 2.67, and effective utilization efficiency 36.3 per cent. The main objection was keeping the reflectors clean.



NEW YORK MUNICIPAL CAR—FIG. 19—LIGHTING ADOPTED

56-watt bowl-frosted lamps in white glass reflectors, and 10-watt all-frosted emergency lamps.

No. 3.—The last test was made on twelve 94-watt tungsten lamps in indirect reflectors and five 10-watt emergency lamps in rosettes, located down the center line of the ceiling. To get maximum headroom for these reflectors and still have them out of the way of passengers, special inverted cone-shaped containers for the reflectors were built into the stanchions along the center line of the car (Fig. 18). Unfortunately the construction of the car necessitated spacing the units rather far apart, so that uneven illumination resulted. In addition to the bowls, smaller inverted bowls were mounted on the horizontal grab rails, at points shown in Fig. 8. Each of these contained one 94-watt tungsten lamp, making a total of twelve 94-watt and five 10-watt lamps in the car. The average foot-candles were 8.5 and 4.7 at normal and 85 per cent voltage, watts per square foot 2.01, effective lumens per watt 4.21, and the utilization efficiency was 53.4 per cent. Much difficulty would be experienced in keeping this equipment clean.

CONSIDERATIONS WHICH FIXED THE CHOICE

General Effect and Appearance.—The general effect and appearance of each system under test were judged by comparison with present methods of car lighting for similar service, namely, with the use of tungsten lamps but without reflectors. Under this item was also considered the effect of the distribution of light on the various parts of the car.

Lack of Eyestrain.—The effect of the light on the eyes was particularly noted by a large number of observers.

Ease in Reading for Seated and Standing Passengers.—Particular attention was given to the possible shadows thrown on reading matter of seated passengers by passengers standing in a crowded car. In some cases it was found that passengers could obtain proper light in any position; in others it was necessary for them to move in their seats, often to uncomfortable positions, to obtain proper light.

Efficiency of System.—The efficiencies of the systems tested differed widely. In some cases this was largely due to the type of reflector used; in others to the position of the reflector, shape of the ceiling, etc. In several tests it was evident that improvement could be made by changes.

Maintenance.—The question of maintenance was serious. Some of the most desirable arrangements of reflectors and lights were handicapped by the dust problem. With a large number of small units this difficulty increases.

Energy Consumption.—To secure a reasonable operating cost, low energy consumption was one of the important factors. The indirect system of lighting required considerably more power than the direct, while the semi-indirect came between these two.

Depreciation.—The relative loss of reflecting power, due to accumulation of dust on the various types of reflectors, also received consideration.

Emergency Lighting.—It was decided that sufficient light would be obtained from the emergency lamps to permit clearly distinguishing people and various objects in the car with the main lamps extinguished.

A thorough study finally led to the adoption of a single line of fifteen 56-watt bowl-frosted tungsten lamps placed symmetrically down the center line of the ceiling, equipped with reflectors, as shown in Fig. 19, supplemented by six 10-watt all-frosted round-bulb tungsten emergency lamps. One big unit was placed on each end bulkhead of the car to bring up the illumination at these points. This system was chosen as the one containing the highest percentage of satisfactory illumination, low energy consumption, low maintenance and upkeep and pleasing appearance.

The emergency lamps were placed in rosettes, one being located on the side wall over each pair of doors. These lamps do not burn while there is power on the line, but the instant that fails they are automatically thrown onto a storage battery.

In the car as finally equipped the illumination averaged 5.94 foot-candles at normal and 3.85 at 85 per cent voltage, the energy consumption was 1.44 watts per square foot, effective lumens per watt 4.14, and the utilization efficiency 50.6 per cent. These data are not comparable with the other tests, due to the use of bowl frosted lamps (instead of clear), also a larger number and different arrangement of lighting units.

It was interesting to note that the low intensities of illumination, at stations 7 and 17, were opposite the entrance doors, which are dark green, in comparison to the white finish between doors. The curves were slightly high at stations 2, 3 and 4, due to the fact that the end lamps are located on the bulkheads considerably lower than the rest of the lamps in the car.

On the whole, the illumination is remarkably soft, even and pleasing. It is not possible to note any unevenness with the naked eye. The use of bowl-frosted lamps lowers the efficiency a little, but also eliminates glare, even when one looks directly at the lamp.

Report On Motor Vehicles

Committee on Operation of Motor Vehicles Presents Report on "Jitney" Bus Situation—Statement for the Press—Cost Analysis by Bureau of Fare Research

A meeting of the committee on operation of motor vehicles of the American Electric Railway Association, held in New York on March 16, was mentioned briefly last week. The conclusions of the committee are summarized in a report printed below, submitted to President Allen of the association. The report is signed by the four members of the committee: Britton I. Budd, Chicago; Henry G. Bradlee, Boston; William A. House, Baltimore, and C. L. S. Tingley, Philadelphia.

REPORT TO PRESIDENT ALLEN

The special committee on the operation of motor vehicles, appointed by you to consider the "jitney" bus and its effect upon electric railway operation, begs leave to submit its report as follows:

Your committee has held two meetings, at which the information compiled by the secretary was carefully reviewed.

Consideration of the information in the hands of the committee has convinced it that the "jitney" bus, while at the present time a seeming menace to the interests of the railways, is in general the product of present business conditions and the present state of unemployment, is economically unsound and cannot for long continue to exist. It is, however, at present causing, and for some time to come may cause, a diminution in the revenues of those properties located in cities in which the "jitney" operates. A report prepared by the bureau of fare research bearing on the cost of service of the "jitney" bus is transmitted herewith.

Your committee desires to emphasize the distinction between regular motor bus service and the "jitney." The latter may in general be said to possess these characteristics:

It is the operation of the ordinary four to seven-passenger cars, usually second-hand and of the cheaper makes, by the owner or lessee, for the carriage of passengers for short distances. The service is without fixed schedule or route, and is operated only in such sections as afford a profitable haul.

Your committee is convinced that the evil effects of "jitney" bus operation may only be corrected by the public and not by the companies, and that the companies' part in the elimination of these evils must be confined to the fair and square presentation of the facts in connection with the case, as they affect the public.

In this connection, two elements of the situation stand out above all others:

First, that the ability of railway companies to furnish adequate and reliable service depends upon the patronage of the public, and that the curtailing of this patronage through the operation of the "jitney" must necessarily reduce the ability of the companies to give such service.

Second, that the loss to the community through diminution in taxes and other public charges paid by the railway companies, wear and tear on streets and highways, increased accidents, and ultimate deterioration in electric railway service will more than offset any gains to the community which may arise out of "jitney" operation.

With the idea in mind of affording assistance to the member companies of this association in their task of awakening their communities to the true situation, your committee appends to its report:

First, a statement designed for use in the press, in which has been assembled what the committee believes to be the salient points in the argument against the unrestricted operation of the "jitney." This statement the committee proposes to supplement from time to time, with such other publicity matter as it believes will be of service to member companies.

Second, a statement intended for general circulation, and for such use as the member companies may desire to make of it, which elaborates and puts in terms easily understood by the ordinary citizen, the reasons why this "jitney" competition is not to the best interests of the community.

Your committee has examined many regulatory measures which are in effect or under consideration, and for your information two typical forms are appended hereto. Copies of additional measures are on file in the office of the association and will be furnished to member companies or to public officials interested, upon request to the secretary.

On the matter of regulation, your committee believes it important that this fundamental idea be kept in mind: If the "jitney" is to enter the business of the common carrier, which is in fact what it is doing, then it should by the proper authorities be declared a common carrier and subject to all the duties and obligations placed upon common carriers.

Electric railways are operated under strict laws, ordinances and commission requirements, which have been instituted by the representatives of the people, in the interests of the public and for its protection. If equal protection to the public interest is to continue, it is obvious and equitable that the same requirements and obligations, or other requirements and obligations meeting the special conditions which have arisen, should be placed upon any form of local transportation which seeks to acquire the same rights and privileges upon the public highway.

FOR THE PRESS

The special committee of the American Electric Railway Association, consisting of Britton I. Budd, president Metropolitan West Side Elevated Railways Company of Chicago; H. G. Bradlee, president of the Stone & Webster Management Association of Boston; William A. House, president United Railways & Electric Company of Baltimore, and C. L. S. Tingley, vice-president the American Railways Company of Philadelphia, which has been investigating the subject of "jitney" buses, has submitted its report to the association.

The committee says:

"The 'jitney' is a product of unemployment and has sprung into existence primarily because the owner or lessee, being out of work, is for the time being content with such income as arises from the small difference between the fares collected and the cost of gasoline, tires and minor repairs.

"The committee's investigations have been such as to convince it that the operation of the 'jitney' is not profitable to its operators. This is shown conclusively by the constant change in the personnel of the operators of these machines in the cities where the 'jitney' has been established. The experience in all of these places is that few men stay in the business longer than a month or

two, and the conclusion is inevitable that such owners find the business unprofitable but that their places are supplied by others, who are led to take up the work because of the advertising that has been given to the 'jitney' proposition and to a certain extent because of the representations of automobile dealers, anxious to secure a market for their second-hand cars.

"In the meantime, however, it must be borne in mind by those communities which are encouraging 'jitney' operation that the revenue received by their proprietors is taken from the revenue of the electric railways, and that, because the ability of these railways to furnish adequate service depends entirely upon the moneys received in fares, such diminution in income lessens the ability of the companies to furnish the service demanded. Communities are apt to forget the benefits which are received from electric railway operation and which are not received from 'jitney' bus operation. Included in these are the payment of a very large amount in taxes and in other public charges, extensive contributions toward the cost of paving, the maintenance of unprofitable lines necessary to civic development, the maintenance of fixed routes and fixed schedules and service uninterrupted so far as possible by weather conditions, the investment of a large sum of money in the equipment necessary to take care of the demands during the time of extraordinary travel, the provision of comfortable and safe cars, properly lighted and suited to the varying conditions of the seasons, the system of transfers, whereby the revenues of the company are largely reduced, in order that transportation may be furnished to all parts of the city, its financial responsibility for the damages resulting from the accidents, its submission to the control of the regulatory bodies as to capitalization, rates and service, and, above all, the fact that a very heavy percentage of its income is returned to the community, in the shape of taxes, public charges, wages, payment for supplies and other items.

"Contrasted with the benefits to be derived from the operation of 'jitneys,' your committee believes that the advantage to the community is all with the electric railways, and that it is, therefore, for the communities to decide whether, in their own interest, the 'jitney,' being a common carrier and seeking the privileges granted to common carriers, should not be obliged to assume the obligations of a common carrier.

"In other words, it is for these communities to say whether, as a matter of protection to the public, the 'jitney' should be compelled to operate over fixed routes and upon fixed schedules, whether it should be placed under the jurisdiction of such regulatory bodies as exercise jurisdiction over railways, should contribute in taxes for general city purposes and for paving purposes a sum proportionate to that contributed by the railways, should be held to strict accountability for accidents, should be required to establish its responsibility for damages arising from such accidents, should be compelled to provide for the safety of its passengers, and should maintain the same standard of service required of electric railways.

"Every obligation placed upon the electric railway has been so placed by the representatives of the people in the interest of the people.

"It is now for the people, for whom this elaborate system of safeguards has been put into effect, to say whether an untried and evidently inefficient experiment in local transportation should, without restrictions, without the exaction of a return, with no responsibility and with no obligations, be given the use of the streets and highways, for which use the electric railways pay so high a price.

"This, the committee feels, is the question that squarely confronts every community which has permitted the unrestricted operation of the 'jitney.' It is, moreover, a question which must be decided by the community and in the solution of which the part of the companies is simply to point out the undoubted facts."

REPORT OF BUREAU OF FARE RESEARCH

The report of the bureau of fare research will be published in pamphlet form by the association for distribution among the members. An abstract follows:

Such regulation as has been undertaken through city ordinances may be classified as to the intent of its provisions as follows:

(1) Requiring "jitney" operators to carry liability insurance or to execute a bond for $10,000 or other substantial sum, for each car operated in order that the public may be assured of their financial reliability in the event of accident.

(2) Requiring and charging a fee for a license in order that (a) the "jitney" shall contribute to the common funds of the community, and (b) the casual and irresponsible operator may be eliminated.

(3) Providing for the regulation and licensing of drivers in the interests of safety.

(4) Providing for definite routes and schedules as affecting reliability of service.

(5) Providing standards (loading, lighting and heating) to promote the comfort and convenience of passengers.

(6) Providing definite rates of fare.

(7) Providing penalties for failure to comply with regulations (fines and revocation of license).

The following tabular representation of ordinance requirements is drawn from copies of ordinances either proposed or adopted. The table is incomplete and some of the requirements may be or may have been altered before adoption. Numbers correspond to numbered paragraphs above:

Table I, Showing Requirements in "Jitney" Ordinances

City	Requirements in Ordinance
Birmingham, Ala.	1
Fresno, Cal.	1 to 4, 6, 7
Long Beach, Cal.	1 to 4, 7
Los Angeles, Cal.	1 to 5, 7
Oakland, Cal.	1 to 4, 6, 7
Pasadena, Cal.	1, 2, 4, 7
San Francisco, Cal.	1 to 4
Boise, Idaho	1 to 3, 7
Oklahoma City, Okla.	1, 2, 4, 7
Fort Worth, Tex.	1 to 4, 7
Port Arthur, Tex.	1 to 4, 7
Seattle, Wash.	2 to 5
Spokane, Wash.	1, 2, 4

The city of Denver has passed an ordinance requiring each individual contemplating engaging in the passenger transportation business to obtain a franchise.

Cost of Operation

An examination of the various elements of the cost of operation of "jitney" buses may be conveniently made under the general groups of accounts in use by electric railways. Under the head of way and structures there will be normally little expense for the man who operates his own car. Companies, however, which maintain their own garages or own and maintain general office buildings will incur expenses properly listed as maintenance of buildings, fixtures and grounds, and as depreciation of structures. Inasmuch as the greater part of the operators of "jitneys" own their cars and keep them in sheds and stables not otherwise in use, no cost has been considered under this head. Individual "jitney" owners are under no necessity of counting as part of the cost of operation, taxes and interest on the investment in and the cost of maintenance of property otherwise idle. There have, however, been considered a part of such items under the caption of garage costs.

Under the heading of equipment some rather exten-

sive cost figures have been kept during the past year by a company which is a member of the American Electric Railway Association. This company operates several types of cars in different cities, and its records based on twenty Ford cars in service for eight months disclose an expense of 1.3 cents per mile for maintenance of chassis and body. Tires cost 1.2 cents per car-mile, and miscellaneous expenses for maintenance and replacement of parts amount to 0.3 cent per car-mile, or a total for the three items of 3.3 cents. These costs do not allow for depreciation and replacement of the car. Corresponding figures from two other reliable sources and covering other types of cars are respectively 7.71 cents per car-mile and 4.56 cents per car-mile.

Under the heading of power there must be included the cost of gasoline and oil, and engine maintenance. For the Ford cars above referred to, the cost for these items was slightly more than 2.5 cents per car-mile, while the amounts for the other two types of car were 4.43 cents per car-mile and 2.39 cents per car-mile respectively.

Under the heading of conducting transportation the major item is the wage of the driver. The figures which the bureau has been able to obtain for this show a wide variation. One "jitney" company pays 2 cents per mile; one 30 cents per hour; another pays $8 per week to foreigners for this type of work. Still another company is reported as paying $15 per week and one pays the driver 35 per cent of the gross receipts. Inasmuch as the possession of a license is necessary in many cities if one wishes to operate a car, it seems that the minimum wage which can be paid will not be greatly below $2 per day and the man who drives his own car will probably consider his time worth at least $2 per day. Less may be paid, however, in the case of men and boys who operate cars for three or four hours per day in addition to some other occupation.

There will usually be little to be considered under the heading of traffic. An occasional payment for advertising and solicitation may occur, but this in general may be neglected and may to a certain extent be offset by revenue from advertising.

Injuries and damages and insurance will be the most important items in the general charges, and in many instances these will be by far the largest expenses to be met by the owner-operator. In one of the Pacific Coast cities, each of the three local bonding companies has, since the advent of the "jitney" bus, refused to issue indemnity insurance for such vehicles, and in a somewhat smaller city the rates for such policies have been increased from an annual fee of $50 to one of $250.

However, the rates for insurance indemnifying automobile operators against loss through injury and damage suits are not as yet based upon sufficient experience to render them stable, and as "jitney" buses become numerous, they are being increased. At present the rate for a Ford car operated for hire in New York City is $150 per year. To this sum should be added insurance against damage from fire, against damage from collision, against loss by theft, and against judgments obtained by employees. Probably these risks can be pooled through insurance for a sum ranging from $200 to $300 per year.

Garage expense, cleaning and inspection may be figured between $12 and $20 per week. This expense will be avoided by owner-operators of single cars, but is nevertheless a real outlay which must be taken into account where several "jitneys" are operated by employees.

TAXICAB OPERATING COSTS

The experience of taxicab companies is also of interest. The estimated figures shown in Table II were prepared some months ago by Benedict Holden, former counsel of the Mason-Seamon Taxicab Company operating in New York City. They are presented without extended discussion as a contribution to the subject from one closely associated with the operation of automobiles for hire and in possession of pertinent information. The Ford town car is the one assumed in the following table, in which the figures are given in cents per mile:

TABLE II.—EXPENSES PER MILE FOR TAXICABS

1. Drivers' wages, clothing and gasoline	4.07
2. Lubricants	0.05
3. Tires	2.00
4. Washing, polishing and garage attendance	0.70
5. Repairs, labor	0.85
6. Repairs, material	0.33
7. Painting, upholstering, etc.	0.17
8. Rent	0.56
9. Light, heat, power	0.14
10. Taximeters	0.20
11. Licenses	0.07
12. Injuries and damages	0.50
13. Office and supervising salaries	0.76
14. Advertising	1.11
Total	11.51

These figures were based on the assumption that 15,000 miles would be run annually per car. Items 4, 8, 9, 10, 11, 13 and 14 are nearly independent of the miles run, and if a car made 25,000 miles instead of 15,000 miles in a year, the cost per car-mile would become 10.1 cents instead of 11.5 cents. Eliminating advertising and rent of taximeters, expenses which the "jitney" operator will reduce to a minimum or avoid entirely, the total becomes 9.3 cents per car-mile. To this figure, however, there should be added at least 0.8 cent per car-mile for depreciation of the car, so that on the basis of these figures a car should earn at least 10 cents per mile to pay expenses. In Table III the above figures as well as the foregoing ones are summarized in classified form.

FIXED CHARGES

In addition to ordinary operating expenses, the items of depreciation and interest are essential parts of the cost of service. By far the largest number of "jitney" buses in service are Ford five-passenger touring cars, costing about $500. The private user receives an allowance of $200 on an old car turned in on the purchase of a new one, this being based on an estimated normal use of 5000 miles for one year. For two years' operation, or 10,000 miles, the minimum depreciation is about $275.

TABLE III.—OPERATING EXPENSES OF SMALL AUTOMOBILES

	Company-Owned Automobiles		Estimate for Taxicabs	
	Cents per Car-Mile	Dollars per Year	Cents per Car-Mile	Dollars per Year
Way and structures equipment:				
Car body and chassis	2.1		1.35	...
Tires	1.2	7.71, 4.56	2.0	...
Power:				
Engine maintenance	2.5, 4.43, 2.39		1.5	...
Gasoline			0.95	...
Conducting transportation:				
Drivers	2.0	416—532	2.5	...
Garage expense			...	105
Traffic			...	166
Advertising			...	...
General and miscellaneous:				
Supervision and office expenses			...	219
Injuries and damages		75—130	...	75
Insurance		50—130	...	...

However, there seems little reason to doubt that, considering the excess of mileage over 5000 made yearly by the "jitney," the minimum depreciation will be $200 whether new cars are secured each year or on alternate years. Similar figures furnished by individual owners of private cars range from $160 to $225.

Of course, the cheapness of second-hand cars may influence individual owner-operators to enter the "jitney" business, but it appears unlikely that such competition will be of as long duration or as serious as that of the

owners of new cars of recent design. Consequently, the annual cost of maintaining the investment in a Ford car may be taken as $240.

The items of taxes and license fees may be considered together at a minimum of $5. There is no uniformity of license fees and no estimate can be made as to the amount of the average fee.

Collecting the figures and putting most reliance on those coming from companies which keep cost data a tentative summary can be made. Looking at the matter from the point of view of those who drive their own "jitney" buses and who will be persistent but not serious competitors, the cost of operation is simply the expenditure for gasoline, oil, repairs and tires, and the difference between this amount and the fares collected represents profits. The lowest reliable figure for these items, reported in Table III, is 5.8 cents per mile. Assuming a 2.5-mile route (round trip 5 miles) and 75 miles as a day's run, $4.35 represents the "out of pocket" cost. If four passengers are hauled on each trip the fares will amount to 40 cents per round trip, or $6 per day, leaving a wage for the operator of $1.65. A shorter haul or a higher number of passengers will increase the operator's wage but it is not likely that much more profitable conditions than those assumed can be found regularly.

In the case of the company which purchases machines for the service and treats the whole matter as a business proposition the costs varying with the mileage made may be placed at 5.8 cents per mile. Other operating expenses to be considered are insurance, amounting to $200 per year; cleaning, inspection and housing, $100 per year; wages of driver, $700 per year; superintendence and management, $195 per car per year, the latter figure being based on the expenses of supervision of a large taxicab company.

The above operating expenses may be summarized as 5.8 cents per car-mile plus $1195 per year. To these must be added $240 interest and depreciation, and for want of better information $5 each for state registration, personal property tax and public vehicle license. The total then is $1450 per year plus 5.8 cents per car-mile, including an 8 per cent return on investment. In other words, the expense is $4.05 per day plus 5.8 cents per mile.

MAXIMUM PROFITABLE HAUL FOR "JITNEYS"

If we assume that 75 miles are run per day and that four passengers are handled on each half round trip and letting S represent the length of the route or one-half round trip, the number of passengers handled per day will be $75 \times 4 \div S$. At 5 cents per passenger the revenue in dollars will be $15 \div S$. This must equal the cost, which is $75 \times 0.058 + 4.05$, and if any interest on investment is earned the revenue must exceed the cost by the amount of the interest. The effect of interest, however, is negligible, because of the small investment.

On the basis of no return on investment, the relation between the number of passengers per half round trip and the maximum length of half round trip for various daily mileages is shown in Table IV.

Although the above figures will vary from place to place and from time to time, it is believed that they are substantially correct as representing average conditions, and it is to be concluded that competition from the "jitney" bus will be confined to the short-haul business. If the "jitney" service survives the experimental stage and finds, as it may, that after being put by laws and ordinances into its proper relation to the community, passengers can be carried from 1 mile to 2 miles for 5 cents, this short haul competition will constitute the necessity for, and furnish a valid argument for, a much more serious consideration of the zone system of fares on the part of the electric railways and regulatory bodies than

TABLE IV.—MAXIMUM LENGTH OF HALF ROUND TRIP FOR "JITNEY" SERVICE

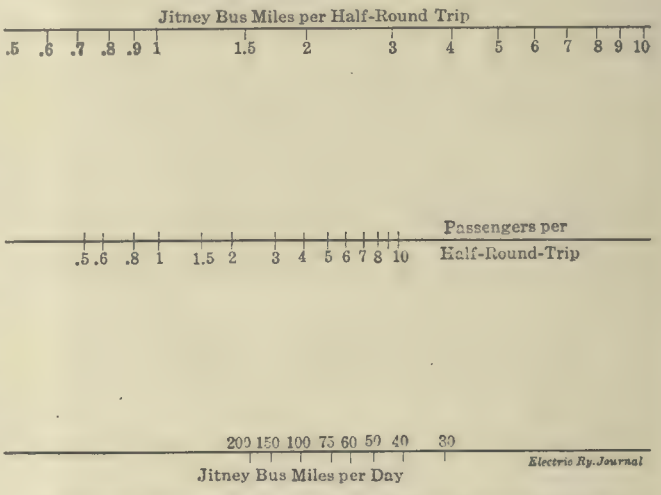
Number of Passengers per Half Round Trip	Length of Half Round Trip in Miles			
	75 Miles per Day	100 Miles per Day	150 Miles per Day	200 Miles per Day
1	0.45	0.51	0.58	0.63
2	0.89	1.02	1.17	1.27
3	1.34	1.52	1.76	1.91
4	1.79	2.04	2.34	2.55
5	2.24	2.54	2.93	3.18
6	2.68	3.05	3.52	3.82

it has received in the past. It is obvious that, to the extent that the street railways are deprived of the traffic that costs less than 5 cents per passenger to handle, they cannot continue to carry passengers for 5 cents where the cost is more than 5 cents.

Fig. 1 is a graphical representation of the relations expressed in the equation:

$$\frac{M}{S} \times N \times 5 = M \times 5.8 + 405$$

where M represents the daily mileage, S the length of a half round trip, N the number of passengers per trip, and 5 the fare in cents. The diagram is used by laying a straight edge across the points corresponding to the assumed figures for the bus-miles per day and for passengers per half round trip, the answer in maximum trip mileage being read on the upper scale. For example, a total daily mileage of 100 with three passengers per half round trip will permit a maximum haul of 1.5 miles.



"JITNEY" BUS—FIG. 1—DIAGRAM FOR DETERMINING MAXIMUM PROFITABLE HAUL

RAILWAY AND "JITNEY" COMPARED

It is of considerable interest also to compare the costs of transportation by the small automobile with the costs on a typical electric street railway, and the following analysis, while admittedly not complete, is nevertheless, it is believed, detailed enough to indicate rather closely the relations between the factors which control the profitable length of haul on street railways. The operating expenses, depreciation, taxes and return on investment of a $20,000,000 street railway plant, classifying the expenses according to the factor which presumably influences its variations, amount to $0.106 per car-mile, plus $0.985 per car-hour, plus $14 per mile of track per day, plus $0.0025 per passenger, plus $980 per day or, since the assumed plant is operating 200 miles of track, $4.90 per mile of track per day.

Assuming a speed of 8½ m.p.h. and that the number of cars in service will be varied to correspond with the variations in traffic so that there is a fixed number of passengers carried on each half round trip, and that a degree of concentration of traffic exists such that if the number of car-miles run during the busiest hour is

multiplied by 10½, the result will be the total number of car-miles of all cars per day, the following equation obtains:

$$P(R - .25) = L(3T + 22.2)$$

where P represents passengers per half round trip, R the fare in cents, L the length of half round trip, and T the minimum headway in minutes.*

Fig. 2 shows the relation between the four quantities which appear in the equation. In this diagram, the figures outside of the two lines should be considered together and the figures inside of these lines should be considered together. For example, assume that it is desired to find out how many passengers per half round trip must be carried to make profitable the operation of a line 3 miles long on which the fare is 5 cents, when the minimum headway during the rush hour is two minutes. Placing a straight edge on the figure connecting 3 miles in Column L and two minutes in column S, the point A on line B is determined. Connecting A and 5 cents in column R, the number 18 is read in column P as the number of passengers per half round trip. If it is desired to determine the number of passengers per day under these circumstances, it may be done by multiplying the number of trips during the rush hour, 30, by 2, to determine the number of half round trips, multiplying this product by 10½ to determine the number of half round trips per day, and multiplying this again by 18 to determine the total number of passengers handled, or more briefly, divide the number of passengers per car by the headway in minutes and multiply by 630.

It is of interest to note in comparison with costs of "jitney" bus operation that with the length of haul of 2 miles, which is about all the "jitney" bus can do for a nickel (with an average of four passengers per half round trip), and with a rush-hour headway of one minute the electric railway would require about eleven passengers per half round trip to make operation profitable at 5 cents per passenger. A car, however, seating twenty people can be run on such a route and schedule as this for a 3-cent fare. A passenger riding 10 miles, however, in a car which is carrying on the average of twenty people per half round trip would have to pay something over 12 cents per ride.

To show the effect of the "jitney" in taking away this short-haul traffic, assume, for example, four lines, 2 miles, 3 miles, 5 miles and 10 miles in length respectively, and assume that the fare on each one is 5 cents. Assume 3000 people ride on each line in 100 half round trips. A

TABLE V.—SHOWING RECEIPTS ON COST BASIS AND FLAT-RATE BASIS

Length of Half Round Trip Miles	Number of Passengers: Half Round Trip	Number of Passengers: Total	Receipts on Cost Basis: Per Passenger in Cents	Receipts on Cost Basis: Total in Dollars	Receipts on Flat-Rate Basis: Per Passenger in Cents	Receipts on Flat-Rate Basis: Total in Dollars
2	30	3,000	2.25	67.50	5	150
3	30	3,000	3.10	93.00	5	150
5	30	3,000	5.00	150.00	5	150
10	30	3,000	10.00	300.00	5	150
Total		12,000	5.09	610.50	5	600
Total excluding 2-mile line		9,000	6.03	543.00	5	450
Total excluding 2- and 3-mile lines		6,000	7.50	450.00	5	300
Total excluding 2-, 3- and 5-mile lines		3,000	10.00	300.00	5	150

* This equation is derived as follows:
As L equals length of line, $2L$ will equal length of track and also the mileage per round trip of each car. Then

$\frac{2L}{8.5}$ = hours per round trip.

If I equals minimum headway in minutes, then

$\frac{2L}{8.5} \times \frac{60}{T}$ = maximum number of cars in service (rush hour)

$\frac{14.1L}{T} \times 10.5$ = car-hours per day.

$\frac{14.1L}{T} \times 89.25 = \frac{1260L}{T}$ = car-miles per day.

$\frac{1260L}{2TL} = \frac{630}{T}$ = round trips per day.

$\frac{1260}{T}$ = half round trips per day.

If P equals passengers per half round trip, then

$\frac{1260}{T} \times P$ = passengers per day.

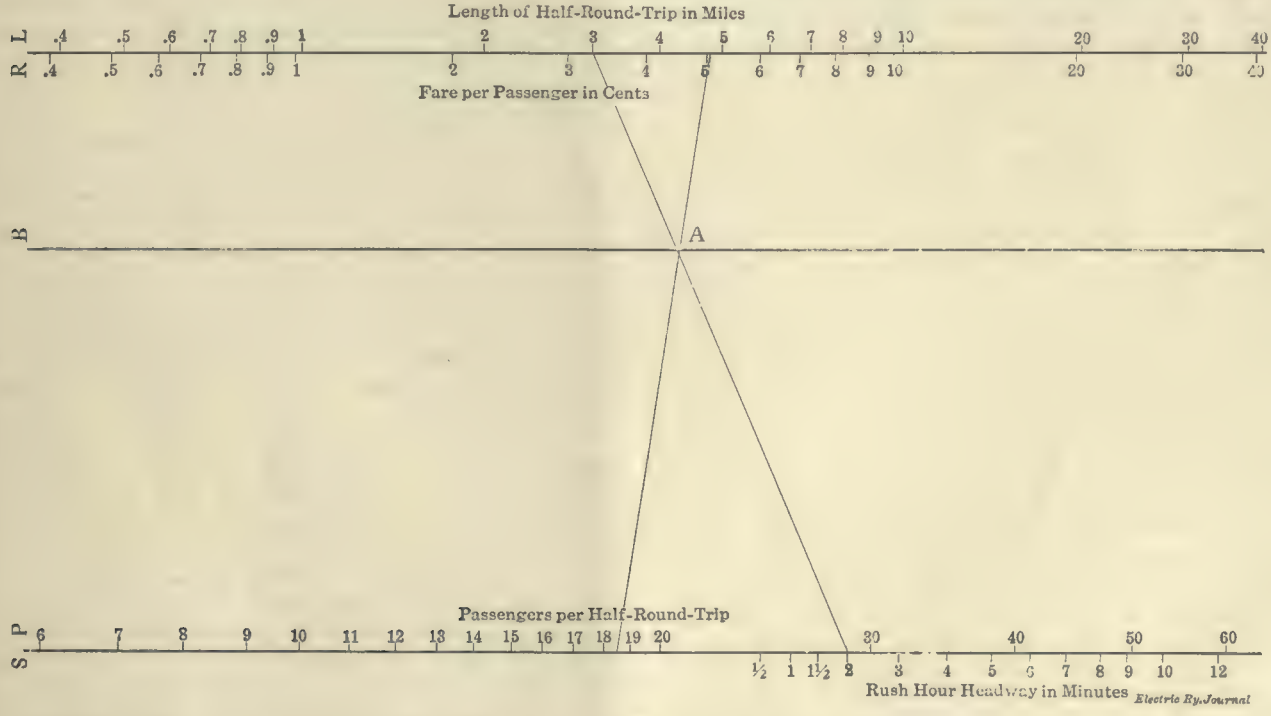
And if R equals fare in cents, then

$\frac{1260PR}{T}$ = revenue per day in cents.

Now if the costs of operation equal the revenues per day

$$2L\,(1400 + 490) + \frac{1260}{T} \times 10.6 + \frac{148L}{T} \times 98.5 + \frac{1260P}{T} \times 0.25 = \frac{1260PR}{T}$$

Or $P\,(R - 0.25) = L\,(3T + 22.2)$.



"JITNEY" BUS—FIG. 2—DIAGRAM FOR DETERMINING VARIOUS FACTORS INVOLVED IN BUS OPERATION BASED ON ARBITRARY COST PER MILE

fare at cost on the previously-outlined basis would yield the railway $610.50, while the flat-rate, 5-cent fare yields $600, as indicated in Table V on page 623, the two figures in this case being in substantial agreement.

The elimination of the 2-mile trip would clearly require that 6 cents be made the flat rate for the remaining lines, and the elimination of the 3-mile and 5-mile lines would raise this flat rate first to 7.5 cents and then to 10 cents.

It must be evident then that the "jitney" bus can compete in the matter of the cost of operation only under very special conditions with the electric railway, and it should be borne in mind that each passenger now riding 2 miles on an electric car contributes something toward the cost of carrying the passenger who rides 10 miles. If the "jitney" bus, then, is permitted to compete with electric lines for this short-haul business, it is obviously but a step toward the zone system of fares.

Electrical Night at N. Y. R. R. Club

Recent Progress in Steam Road Electrifications Described before the New York Railroad Club

The eleventh annual electrical night of the New York Railroad Club was held Friday, March 19, with some 500 members present.

Following the opening remarks by William McClellan, chairman of the committee on electrical subjects, George Gibbs of Gibbs & Hill, consulting engineers, New York, was introduced.

Mr. Gibbs' Remarks

Mr. Gibbs first discussed, with the aid of slides, the electrification of the Norfolk & Western Railway. The superiority of electrification in this case, he said, was due largely to the presence of a long, continuous grade and the opportunity it afforded for the maximum utilization of equipment. If electrification should be extended, say for the entire division of 120 miles, the economies would be less because grades occurred in the middle of the adjoining sections.

Speaking about the equipment in hand, Mr. Gibbs said that twelve electric locomotives were replacing thirty-two steam locomotives. This was due in part to the fact that an electric train would have but two electric locomotives, header and pusher, as against three steam locomotives; and in part to the elimination of engine watering and coaling.

One characteristic of the new locomotives was their ability to exert full tractive effort for a considerable time, say five minutes, while standing. In starting trains it was difficult always to get synchronous action of the header and pusher. With regenerative control it had been found feasible to go down grade at 15 m.p.h. without the use of brakeshoes. As much as 8000 hp had been put into a train, an amount, he believed, never before reached in either steam or electric operation.

Mr. Gibbs then discussed the Paoli electrification of the Pennsylvania Railroad, also with the use of slides. In this case the reason for electrification was that it would reduce existing track congestion at less expense than would the acquirement of land for more track and terminal facilities. It was not, then, a question of securing a direct return on the investment. Among Mr. Gibbs' views were some of the newly-installed light signals which show rows of white lights in any one of three positions—horizontal, 45-deg. and vertical—to take the place of the usual movable semaphore arms.

Mr. Eaton's Remarks

The next speaker, G. M. Eaton, Westinghouse Electric & Manufacturing Company, presented a series of slides which showed the progress of the Norfolk & Western locomotives from the receipt of the Baldwin chassis to their completion at the Westinghouse works. In discussing various details of the locomotives Mr. Eaton mentioned the liquid rheostat. This device has no moving plates. Instead of moving the plates to vary the resistance, a valve and pneumatic cylinder are provided for the converse act of raising the water.

Professor Pender's Remarks

Harold Pender, professor of electrical engineering University of Pennsylvania, then discussed the use of electric motor trucks in large freight houses and stations. As in other kinds of electrification, density of traffic determined the question of economy. In one instance of freight moving with two-wheel hand trucks the cost was $5.33 per ton-mile whereas electric trucks in one Chicago freight house had lowered the cost to 39 cents per ton-mile and in another Chicago house to 48 cents per ton-mile. These costs included labor, interest, depreciation, cost of energy, etc.

W. S. Murray's Remarks

W. S. Murray, of McHenry & Murray, consulting engineers, New Haven, in taking the floor first referred to his earlier New Haven progress reports before the American Institute of Electrical Engineers and to his more recent paper before the Franklin Institute (see Electric Railway Journal for Jan. 30). He referred to the maintenance costs of locomotives there given and said that these costs, within a few months, would be brought to 6 cents per locomotive-mile and possibly to less.

Operation of single-phase locomotives showed that even without regeneration a most remarkable absorption of starting peaks took place, although the New Haven electric zone is on practically level track. It was found that when 3000-ton electric trains were placed in operation, instead of the expected peaks in the power station load line during the period of acceleration, the load line was actually improved. The explanation of this phenomenon was that when a number of heavy trains are in translation on level track a train that is starting draws down the voltage of the line slightly, not enough to interfere with the schedules but yet far enough to leave the trains in translation at speeds which exceed those corresponding to the lower voltage.

Mr. Murray then discussed what he termed "the visualization of the kilowatt-hour." He said that the capacity of the Cos Cob station had been slightly taxed, but an opportunity had been offered to buy a 4500-kw supply at the eastern end of the line. The question was, what would this comparatively small addition mean? The power records of the New Haven Company had been kept and analyzed so carefully that it was known in advance that the additional 4500-kw could be applied to handle twelve 3000-ton freight trains. On the basis that 1 lb. of coal in the power house delivers as much energy as 2 lb. of coal in the locomotive, it was calculated that the substitution of electric for steam operation of twelve trains would save $70,000. The reduction in engine repair costs with consequent increase in mileage and the saving in line losses, due to using the available energy nearer the points of supply, meant further economies. In fact, the total saving was about $150,000.

He believed that electrical engineers had the tendency to drive trains too rapidly. The New Haven trains were geared for about 35 m.p.h. While that speed was justifiable on the New Haven, because of its heavy traffic, yet if the speed was 35 per cent less the in-

creased tractive effort obtained therefor would permit the operation of 4000-ton instead of 3000-ton trains. Therefore, in considering engines in the future it would be of great advantage to look to tractive effort as well as speed.

In conclusion, Mr. Murray spoke enthusiastically about the tests on the New Canaan branch with the mercury arc rectifier. It offered the best means to join the advantages of a.c. transmission and distribution to the advantages of d.c. propulsion. One practical result on the New Haven would be the possibility of increasing the tractive effort of the a.c.-d.c. locomotives by 50 per cent with all speed characteristics maintained.

MR. ARMSTRONG'S REMARKS

A. H. Armstrong, railway department, General Electric Company, was the next speaker. Referring to the economies of electrification, he said that the first cost of the Butte, Anaconda & Pacific Railway, including interest during construction, was $1,200,000. For handling practically the same tonnage, the railway had saved $240,000 in operating expenses compared with the last year of steam operation. The success of this electrification had led the Chicago, Milwaukee & St. Paul Railway to adopt 3000-volt d.c. electrification. The 113-mile section between Deer Lodge and Harlowton was well under way. In the entire 440 miles only fourteen substations were required, whereas the Norfolk & Western Railway had four substations in an 11,000-volt a.c. 30-mile electrification. The 3000-volt line was reinforced with but 500,000 circ. mils of feeder copper.

MR. TURNER'S REMARKS

W. B. Turner, Westinghouse Traction Brake Company, then described the advantages of actuating air brakes electrically to obtain simultaneous operation of the brakes throughout the train. As an example, a stop made in 580 ft. with the ordinary brake has been made in 330 ft. with electrically-operated brakes, from a running speed of 40 m.p.h. Not only could emergency stops be made in half the time but all other stops were made in less time, more agreeably and with less strain on the equipment.

CHAIRMAN MCCLELLAN'S REMARKS

Mr. McClellan in concluding the meeting, said that it marked his resignation as chairman after many years of service. He was pleased to see that even in hard times money was being spent on electrification. He ventured to prophesy that electricity if used to its fullest extent would abolish all physical limitations of railroads. Rivers and mountains would no longer be an obstacle. The possibilities of multiple-unit operation were as yet hardly realized. The day would come when single cars would be operated much more freely in trunk line service than to-day. The most startling possibility was in operation through distant control. He thought that the day might come when trains would be operated on automatic stops and signals only, and there would be no employee on the train except someone to look after the comfort of the passengers and telephone in case of emergencies. A still greater improvement that lay in the future was a wide-gage railroad from the Atlantic to the Pacific Ocean for freight only. He was willing to predict the possibility of universal electrification, but the only thing he was not willing to predict was what system would be used.

On the conclusion of the speaker's farewell remarks President Syze thanked Mr. McClellan in the name of the Railroad Club for the excellent work that he had performed as chairman of the committee on electrical subjects.

Storm Plays Havoc on Kansas Pole Lines

The accompanying halftone shows how many of the fifty-three poles between Liberty and Excelsior Springs on the Kansas City, Clay County & St. Joseph Railway were blown down by a storm on Feb. 22. In some instances the poles were on embankments higher than the track, while in others they were on a fill. Both the high-tension and low-tension lines were down at many places.



HIGH-TENSION POLES BLOWN DOWN ON THE KANSAS CITY, CLAY COUNTY & ST. JOSEPH RAILWAY

The section mentioned was out of service for four days. The only previous interruption on this railway was Feb. 22, 1914, when a section of the St. Joseph division was out two hours because of poles blown down in a similar storm. The telephone and telegraph companies lost many poles in eastern Kansas and western Missouri, but no serious damage was reported by interurban railroads other than that shown.

Brooms and Street Cars

A recent discussion of brooms appears in the current issue of *Trolley Topics*, the official organ of the Louisville (Ky.) Railway. It is written by G. B. Powell, superintendent of employment of the Louisville Railway. Mr. Powell says:

"Our present type of broom was invented more than a century ago and is quite an improvement over the 'turkey wing' which was in use at that time. There are many kinds of brooms and their uses are varied, and you will find them in all parts of the civilized world, including the rear platform of street cars. The street car broom has developed a one-sidedness from lack of exercise and from standing, straw-end down, in the same position for days at a time, which gives them the appearance of a run-over shoe. Now if you will give them vigorous exercise about once a trip by sweeping out your car, it will benefit the broom by improving its appearance, improve the looks of your car, cause favorable comment from passengers and prevent the inspector from reporting you to the office for allowing your cars to be dirty."

Meeting of Illinois Electric Railways Association

Economies in Power Consumption, Feeder-Tap Protection and Care of Commutators, and One-Man Cars Were the Topics of Discussion at This Meeting, Which Was Held at the New Morrison Hotel in Chicago on March 19

At the meeting of the Illinois Electric Railways Association, held on March 19 at the New Morrison Hotel, Chicago, sixty members were in attendance, President F. E. Fisher presiding. In the business session which preceded the regular program, it was decided to change the name of the association's signal committee to engineering committee, in order to broaden the scope of its future work. The subject assigned to this committee was economy in power consumption, subdivided under three headings, namely: distribution, handling cars, and return circuits.

G. T. Seely, assistant general manager Elevated Railroads of Chicago, in commenting on the importance of making a thorough study of the subject of economies in power consumption, stated that his company had a man who devoted his entire time to this work. Although this man had been thus employed only a short time, excellent results had already been obtained through close attention to the use of heaters, lamps and controllers. This inspector had found that the heaters and lamps, both in cars and buildings, were left in service when they were not required. Although the large demand for power during the winter months made it practically impossible to accomplish much by instructing motormen in the methods of coasting, the rise in temperature during the early spring permitted much to be done by instructing the men along this line.

Continuing Mr. Seely stated that during the remaining portion of the spring, the summer and the fall months, this schooling should result in a considerable saving. Coasting boards have been installed, and by temporarily placing coasting clocks and meters on cars the motormen were shown the effect of the improper use of controllers. Mr. Seely estimated that his company's power bill was approximately $1,250,000 a year, so that a small per cent saved in energy consumption represented quite an item. Marshall E. Sampsell, president Central Illinois Public Service Company, in emphasizing Mr. Seely's remarks stated that, even though power was being sold, it was good policy to instruct the power purchaser how to reduce his energy consumption in addition to effecting economies within his organization.

President Fisher stated that the association had decided to inaugurate a question box, and in pursuance of that idea, he had sent out to the member companies the first list of questions. These, however, had been put in the mail too late to permit a full discussion at this meeting and were referred to the different committees. The president requested all companies to reply to such questions as they desired, mailing the answers to Secretary W. B. Griffin, secretary and treasurer of the Elevated Railroads of Chicago, who in turn would distribute the replies to the committees interested, for final disposition.

Chairman E. E. Soules, manager of the publicity department Illinois Traction System, reported for the publicity committee regarding progress in the preparation of the Illinois Electric Railways Association map. He stated that the area to be included in the map had been slightly enlarged in order to show the lines of all member companies. A preliminary draft of the map had been sent to all the member companies and corrections had been received. The map was in the hands of an artist in the process of a final sketch, and as soon as it was completed it would again be sent to member companies for final check and approval.

Charles H. Smith, engineer executive department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., was then called upon to deliver his paper, "Feeder-Tap Protection in D. C. Apparatus," following which J. M. Bosenbury, superintendent of motive power and equipment Illinois Traction System, Peoria, Ill., read a paper on "The One-Man Car." These papers are abstracted on the next page. The discussion which followed centered around the economies to be obtained by the adoption of the one-man car and details regarding its operation. It was brought out that after the motorman had become familiar with the operation of the one-man car, lengthening of the schedules was unnecessary, even though the single man was required to issue transfers and sell tickets. It was deemed advisable, however, to station flagmen at extremely busy steam-railroad crossings, the operation of the one-man cars making possible a saving which was much in excess of that necessary to pay for this extra crossing protection.

J. M. Strasser, vice-president Illinois Light & Traction Company, Streator, Ill., stated that at one point where one-man cars had been placed in service much opposition on the part of the employees had been experienced. This had been overcome, however, by obtaining other positions for the deposed conductors in addition to convincing the city that it would be possible to give better and safer service than could be afforded under the existing method of operation. Increased safety in operation was believed to be the best argument for the introduction of one-man cars in the smaller cities and towns. It was also considered good policy, should the resultant savings permit, to purchase new cars or at least thoroughly to overhaul the old ones.

At this point J. R. Blackhall, general manager Chicago & Joliet Electric Railway, Joliet, Ill., called attention to the present tendency to seek ways and means of reducing expenses rather than to consider seriously the possibility of obtaining an increased fare. While the one-man car offered a logical and satisfactory means of reducing expenses in the smaller cities and towns, Mr. Blackhall did not believe it a practical proposition for the larger cities. A campaign for increased fares appeared to be the most plausible and practical way to obtain relief. The weight of the argument for higher fares was on the side of street railway companies, because they could show that since their inception the crude horse car had been replaced by the modern electric street car, provided with comfortable seats, heating and lighting systems, while the rate of fare had remained the same. Superimposed upon this argument was the marked increase in the cost of materials, many of which cost 100 per cent more than they did ten or fifteen years ago.

At the close of this discussion the meeting adjourned to the regular association luncheon, during which the members and guests were entertained by songs and music furnished by a chorus and orchestra of employees of the Elevated Railroads of Chicago.

THE ONE-MAN CAR

BY J. M. BOSENBURY, SUPERINTENDENT OF MOTIVE POWER AND EQUIPMENT ILLINOIS TRACTION SYSTEM

If, through the use of the one-man car, it is proposed to place upon the motorman the responsibility for collecting fares and issuing transfers in addition to his other duties, it is manifest that some arrangement should be afforded to simplify and to make safe the method of operating the car. Concentration of the operating devices to which the motorman must give attention is an important requirement, and this may be effected by combining the air-brake valve with the door-operating and step-operating mechanism. Such a combination should provide for stopping the car in the ordinary way and at the same time should open the doors and lower the steps without requiring the motorman to remove his hand from the brake-valve handle. Furthermore, the operation of the air brakes or the operation of the doors and steps should be so controlled that either could be accomplished independently. It is also desirable to include with these functions the application of sand to the rails by means of the brake-valve handle during the progress of a stop and without interfering with any of the other operations.

All of the foregoing requisites have been observed in the one-man cars that are now used on several of the properties of the Illinois Traction System, and, in addition, as the air-brake equipment on these cars is provided with the emergency feature, automatic operation of the emergency valve is provided if the motorman's hand is removed from the controller handle when it is in running position. A rear or emergency door has been provided also, and this is so arranged that if an emergency application of the air brake is made both front and rear doors and steps are automatically thrown open, the release of the air brakes closing them. This is the only circumstance under which the rear door and steps are operated. When the brake valve handle is moved to emergency position by the motorman, sand is automatically applied to the rail.

The principal objections which have been advanced against one-man car operation are that it might retard the schedule by lengthening the time of stops, or by flagging at railroad crossings. The difficulty of attending to the trolley and (in some sections of the country) the race problem are also put forward from time to time as undesirable features. With regard to the effect on the schedule, it may be said that the handling of passengers is largely a question of car design and arrangement. Under the present system of two-men operation the number of unpaid fares on the platform when the car starts is primarily a question of the location of the conductor. But in any case it is highly desirable to have as many passengers seated as possible, or at least past the platform, when the signal to proceed is given, and herein the one-man car does not suffer by comparison.

With regard to the flagging of railroad crossings it is necessary, of course, for the motorman to leave the car and to investigate the safety of the crossing before he returns to his car to move it across. This applies only to crossings where traffic is infrequent, because wherever considerable traffic obtains a watchman is generally stationed at the intersection.

Attention to the trolley or other parts of the car under one-man operation is under about the same handicaps as it is with the fully-inclosed cars of two-man type. Furthermore, the question of the trolley coming off the wire is largely one of maintenance, and it has been found that this criticism has not been borne out in the case of cars with two men when both of them are stationed on the front platform.

In the sections of the country where the distinction in race is made some objection may be advanced against the entrance of negroes by the front door of the car, but this situation does not differ greatly from that which prevails under conditions where the whites enter at the rear, and are obliged to pass through a section reserved for negroes.

In general it has been observed where one-man car operation is practiced that the undivided responsibility has produced a degree of efficiency in operation not normally reached with two-men operation. Step accidents are unknown. Where a comparison has been made between the two methods of operation the results so favor the one-man car that in one instance a claim department has actually requested the use of more cars of this type. The net savings in operation has been variously estimated to be from 8 per cent to 14 per cent of the gross earnings and the cost of arranging a car for one-man operation is almost negligible in comparison.

The attitude of labor toward the introduction of the one-man car will probably be antagonistic, but if any considerable saving can be effected, it follows that the railway company will be in a position to provide better service for its patrons, and to reach this desirable condition the transportation companies must be met halfway by the public. With the possibility of more frequent service, combined with adequacy and at least an equal degree of comfort, it is fair to assume that once the proposition is thoroughly understood co-operation from the public will follow.

FEEDER-TAP PROTECTION AND CARE OF COMMUTATORS

BY CHARLES H. SMITH, ENGINEER EXECUTIVE DEPARTMENT WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Under the title "Feeder-Tap Protection for D. C. Apparatus and a Few Suggestions Regarding the Care of Commutators" Mr. Smith explained how and why feeder-tap protection should be furnished, and stated the precautions necessary to secure good commutator operation. His paper was an extension of one published in the *Electric Journal* of January, 1915.

LOCATION OF FEEDER TAPS

By the location of feeder taps at proper distances from the power station or substation, the resistance or reactance of the feeders suffices to limit short-circuit currents to values which will not cause "bucking" or "flash-over." Mr. Smith quoted an official of a large system to the effect that his practice is to allow no taps to be made within 2000 ft. of stations. Recently, a tap located 1000 ft. from a station caused flash-overs and temporary shut-down. Removal of this tap to a distance of 2000 ft. stopped the trouble. In another case taps were found in front of substations in which flash-overs were serious. The cutting of these taps produced improvement, and the removal of the nearest taps to a distance of 4000 ft. entirely overcame flashing. Other illustrations cited by the speaker demonstrated the importance of furnishing proper feeder-tap protection, from 75 per cent to 90 per cent of the trouble from flashing being due to lack of such protection.

No general rule can be laid down for determining the proper tap distances. So many variables enter that the problem in each case can best be solved by moving the "close-in" taps until the resistance of the circuit becomes great enough to cushion and protect the machines. The variables which enter in determining tap distances are as follows:

(1) Capacity behind the generating unit. With a rotary converter the greater the capacity at the source of generation the greater will be the damage in case of trouble, and the more nearly equal the capacities of rotary and a.c. generator the less serious will be the damage. Motor-generator sets are better protected through the cushioning effect of the windings, including the transformer windings, as are also engine-driven d.c. generators. In the latter, there is the cushioning effect of the engines in addition to that of the windings.

(2) Capacity of the rotary or generator. The larger the unit the less subject is it to flash-overs.

(3) System voltage. The lower the voltage the nearer to the machines may the taps be placed.

(4) Sizes of feeders and rails. The larger the feeders and rails the greater must be the tap distances from the machines.

(5) Disposition of feeders. The distribution of feeders should be such that each will carry a reasonable proportion of the station output. Trouble on a feeder carrying more than its share is frequently responsible for flash-overs.

(6) Bonding. Broken bonds and poor ground connections have occasionally been known to produce flash-overs.

(7) Sizes of cars. With a given size of substation unit the heavier the car equipment and the higher the motor rating the greater will be the "drag" upon the substation equipment.

In general, experience has shown that on a 600-volt system the first tap should not be less than 2500 ft. from the machines, and on a 1200-volt system, 5000 ft. The line losses due to these distances are of no consequence compared with the energy lost through flash-overs and the expense involved in repairing damaged apparatus. Furthermore, with long feeders the car equipment is benefited by being worked at a more uniform voltage.

Kinds of Flashing

Mr. Smith analyzed the different varieties of flashing under these heads: Quick "squealing" or "kicking" flash; flash-over or buck-over; pedestal flash, and flash to the V-rings. The first shoots from under the brushes but does not carry across. It rarely results in much damage. Flash-overs are those which reach from positive to negative brush-holders. They may or may not prove destructive, but after one occurs the machine should be shut down and the commutator and brush-holders cleaned. Flashes to the bearing pedestal are invariably destructive and, in addition to blistering and burning the commutator and the brush rigging, burn the pedestals. They are largely traceable to the practice of grounding the frames of machines of which the negatives are grounded. Flashes to V-rings are not as common as formerly, as the rings are now insulated.

With rare exceptions, flashing is due to troubles originating outside the station, that is, line and car troubles in combination with "close-in" taps. The general impression that motor-driven d.c. generators, engine-driven d.c. generators, twenty-five-cycle rotaries and sixty-cycle rotaries, are equally suitable for all d.c. service, regardless of conditions, is not correct. These machines are temperamentally different, although there is no d.c. service to which they are not equally applicable provided they are properly installed and protected.

Commutator Troubles

The ideal commutator is a smooth one, and if it were possible to find brushes which would carry current at the high density now required and at the same time be sufficiently abrasive to keep the mica down, the practice of slotting would soon lose favor. Undercutting is objectionable because the slots must be cleaned, the bars must be bevelled, and the copper must be removed from the slots after turning. A revolving stone gives satisfactory results in the surfacing of commutators.

The rate at which slots are bridged over is governed by the hardness of the bar copper, the width of the bars, the speed, the angle at which the brushes are set, the direction of rotation and the brush characteristics. In addition, lubricants have to be more intelligently applied with undercutting than without.

The "seasoning" of the commutators at the manufacturer's shops to render them permanently tight in service is difficult. Bars loosen due to the expansion and contraction of the copper and the V-rings, and to the results of the heating of the mica. Tightening of the V-rings while the commutators are hot usually cures the trouble, especially if bolts are tightened at opposite ends of diameters. Loose commutators are likely to cause flashing on slight provocation. Proper care of brushes is also an element in satisfactory operation.

In conclusion Mr. Smith makes the inquiry, "Is it not worth while to protect service, apparatus and men against the damaging effects of flashing and 'buck-overs' when the method is so fundamentally simple and the cost so small?"

Gear and Pinion Operation

In the current issue of the *General Electric Review*, A. A. Ross contends that operating conditions have much to do with gear life. He states that the involute tooth is best suited for railway motor work on account of the greater thickness at the root, and because the distance between pinion and gear centers can be slightly increased without seriously affecting the mesh. He recommends the "standard" rather than the "stub" tooth wherever it can be used, for "railway motor gearing is bad enough at the best."

Under operating conditions affecting wear Mr. Ross emphasizes four, as follows: (1) Grit, which accumulates in the gear pan. While practically every master mechanic will disclaim its presence it is there and has been found in quantity up to 24 per cent. It usually enters between gear hub and gear pan in the form of street dust, brakeshoe dust and wheel wash. Carelessness during inspection is also a cause of gritty grease. (2) Excessive lining wear, which produces improper mesh. This also produces noisy chattering affecting commutation. (3) Consistency of lubricant. This should be of such consistency and used in such quantity as to permit the teeth to dip frequently. (4) Number of stops in schedule, motormen's methods of accelerating and braking, etc.

The practice of driving pinions home with the sledge is bad. After fitting, the pinion should be heated throughout in boiling water and lightly tapped into place. In dismounting a puller which grips all of the teeth is safest. On account of "fatigue" of the metal pinions should be scrapped on a safe mileage basis, regardless of wear. Gears and pinions should be of the same hardness. In mounting solid gears without keys a pressure of 20 to 30 tons is sufficient for city cars and 50 tons for interurbans, as it takes a higher torsional pressure to twist a gear than to mount it.

March 11 was known as safety day among the employees of the Brooklyn (N. Y.) Rapid Transit Company. It was celebrated in the evening at the main clubhouse of the company at Jamaica and Alabama Avenues, with an entertainment under the auspices of the Brooklyn Rapid Transit Employees Benefit Association.

A. R. E. A. Convention Proceedings

An Account of the Action Taken by This Association on the Various Committee Reports

The discussion of the committee reports at the annual convention of the American Railway Engineering Association, held in Chicago, March 16-18, 1915, abstracts of which were contained in the issue of the ELECTRIC RAILWAY JOURNAL for March 20, brought out additional facts of interest to electric railways. President W. B. Storey, Jr., vice-president Atchison, Topeka & Santa Fé Railway, reviewed briefly the year's events of interest to railroad engineers, discussing topics relating particularly to the association's work.

ACTION ON COMMITTEE REPORTS

The report of the committee on signs, fences and crossings was presented by W. F. Strouse, chairman, and after some discussion the specifications for galvanized wire fencing, gates for right-of-way fences and concrete fence posts were adopted by the association. This committee's recommendation for track construction and flangeways in paved street crossings and in paved streets was revised so that the 141-lb. 9-in. girder rail was not recommended unless conditions required. For street crossings it was revised and provides for standard track construction with such modification as may be required to suit the situation. Upon motion it was finally decided to refer the question of track construction back to the committee for further consideration.

That part of the roadway committee's report setting forth a classification of soils was referred back for further consideration, while the specifications for sodding were adopted for inclusion in the manual. The formula recommended by the committee on ties to provide an economic comparison of railroad ties with different materials, was also approved and adopted for the same purpose. The information on metal, composite and concrete ties was received as such.

The recommendations of the committee on rail, i.e., that the sections weighing 100 lb., 110 lb. and 120 lb. per yard be approved as standard, that the A. R. A. section *A* also be adopted as standard for 90-lb. rail, that for sections below 90 lb. it was inadvisable to recommend any changes and that these conclusions be presented to the A. R. A. for its adoption, were approved. The specifications for high carbon steel joint bars and for heat-treated, oil-quenched steel joint bars were adopted for publication in the manual. In the discussion of the rail committee's investigation of transverse fissures, Dr. P. H. Dudley, New York Central Railroad, stated that one phase of this investigation had led him to believe that the shape of wheel treads was not as it should be. He found that the coning of the tread materially reduced the tread bearing. He believed that the uniform bearing over the entire head of the rail would produce much better results both as regards rail and wheel wear.

That part of the track committee's report containing tentative plans and specifications for manganese frogs and crossings was received as information. In a similar manner the report of the committee on buildings, portions of which were submitted as information and the other parts containing recommendations for changes in the manual, were approved.

The report of the committee on electricity was largely one of progress, but contained two recommendations, namely, a clearance diagram for equipment and permanent way structures adjacent to third-rail, which was approved by the association for publication in the manual. The second recommendation relating to specifications for crossings of wires and cables over steam railroad rights-of-way was also approved. A recommendation containing certain revisions and modifications in the existing specifications for overhead crossings of electric light and power lines was approved, but on the suggestion of the committee was not recommended for publication in the manual.

The recommendation of the wood preservation committee, namely, that the use of coal tar in creosote be permitted, was approved. In addition to this a specification for creosote-coal tar solution was adopted for insertion in the manual, as well as four rules relating to the water allowance in creosote. In support of the recommendation of the committee on the grading of lumber, the present rules for white and Norway pine and hemlock were rescinded and the suggested rules for grading Southern pine lumber were received as tentative rules.

The report of the committee on ballast brought out more lively discussion than any other submitted at this convention, particularly that part of the report containing a proposed ballast section for single track on tangents. It developed that there was no necessity for banking ballast against the ends of the ties as proposed in the recommended section, since this was believed to be detrimental to the track. In substantiating this the opinion was advanced that the ballast at the ends of the tie becomes clogged, both by powdered ballast and dust, and thereby prevents good drainage. An actual test also had demonstrated that excessive tamping aided in clogging ballast. Banking of gravel at the ends of the ties also made more difficult the maintenance of track circuits when block signals were used, while a change to the drainage section, namely, by exposing the ends of the ties, eliminated this difficulty. Furthermore, it was found that the usual objection to the drainage ballast section did not obtain in practice, namely, that it was difficult to keep the track in line.

Regarding the kind of tile to be used for track drainage purposes, one member stated that in the past too high a value had been placed upon the qualities of ordinary farm tile. Experience had shown that it crushed out of line and filled with silt after a time, becoming valueless for drainage purposes. Vitrified bell and spigot tile was recommended, since it has a higher compressive strength and the bell tends to reduce the amount of silt carried into the tile by water. Following this discussion the track section was referred back to the committee for further consideration, awaiting such time as the report of the other committees investigating questions closely related to this one had made a report.

ANNUAL DINNER

The annual dinner was held in the Gold Room of the Congress Hotel on the evening of March 18, with President W. B. Storey acting as toastmaster. The list of speakers included Charles S. Gleed, president Missouri & Kansas Telephone Company; Sir George Foster, minister of foreign trade and commerce, Dominion of Canada; Frank L. Mulholland, president International Association of Rotary Clubs, and Benjamin Baum, chief engineer maintenance of way Maumee Valley Railroad.

The following officers were elected for the ensuing year: President, Robert Trimble, chief engineer maintenance of way Northwest System Pennsylvania Lines, West Pittsburgh, Pa.; first vice-president, A. S. Baldwin, chief engineer Illinois Central Railroad, Chicago; second vice-president, John G. Sullivan, chief engineer Western Lines Canadian Pacific Railroad, Winnipeg; treasurer, George H. Bremner, assistant district engineer division of valuation Interstate Commerce Commission, Chicago, and secretary, E. H. Fritch, Chicago.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

Committee Meetings Held This Week Included Accountants' Educational, Engineering Lightning Protection, and T. & T. Training of Transportation Employees—Transportation Committees Active Also

CONVENTION TRANSPORTATION MATTERS

Secretary Burritt's office is sending advance information to local transportation committee chairmen regarding the trains to and from the convention. A train will go over the N. Y. Central, northern route, and another over the Pennsylvania via Denver and Salt Lake City. Leaving San Francisco these trains will stop at Yosemite National Park, the San Diego Exposition and other Southern California points, as well as the Grand Canyon of Arizona. The details of these trips have not yet been definitely settled, but they will be round trips of the all-expenses-paid variety. A "special" will also be made up in Chicago and another one-way New York train is contemplated, leaving as late as Oct. 1, arriving in San Francisco on Oct. 4.

ACCOUNTANTS' EDUCATIONAL COMMITTEE

A meeting of the committee on education of the A. E. R. A. A. was held in New York on March 22. The committee members present were George G. Whitney, Washington, D. C., chairman, and F. L. Pryor, Philadelphia, Pa.; E. B. Burritt and H. C. Clark, of the American Association; J. L. Conover, Jr., Newark, N. J., and H. H. Norris, Electric Railway Journal, were present by invitation. The status of the correspondence course was discussed and a number of suggestions for improvement in details were referred to the chairman for conference with the instructor, Professor John R. Wildman of New York University. The desirability of adding an introductory course for accounting and other clerks and for individuals not familiar with accounting practice was considered.

PROGRESS ON THE ACCOUNTANTS' CORRESPONDENCE COURSE

Reports which have been received by the chairman of the educational committee of the Accountants' Association show that about one-half of the individuals enrolled in the correspondence course are now submitting papers for examination by the instructor. This is a very gratifying proportion and shows that an intelligent interest is being taken in the topics covered by the instruction papers. Many of those enrolled subscribed for the course to secure the information for reference purposes, and these also are being benefited although they do not file reports.

As was clearly explained in the prospectus of the present course, it was designed to give a scientific foundation for accounting work to those familiar with the practical details. Classification of accounts is not being considered because there is not yet sufficient unanimity regarding classification to warrant its incorporation in a regular course. Those in charge felt that there are certain fundamental principles of accountancy which permeate all lines of work so that the experience gained in other fields is available in electric railway accounting. The illustrations have, therefore, been drawn from different lines and the students have been left to apply the principles to their own work. As the course proceeds the illustrations will be drawn more and more from electric railway practice.

In view of the somewhat restricted field, the enrollment of a class of more than 300 was an excellent indication of the desire of young electric railway accountants to prepare themselves for doing their work better and thus for promotion. If the result of the year's work is the establishment of a course or set of courses which will be permanent except for their adaptation to changing conditions in the industry, the achievement will redound to the credit of the association and to those who have fostered the movement. It devolves largely upon those who are now following the course to get the most possible out of it, realizing that they are thus assisting in laying the foundation for the future of the course as well as for their own progress.

COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES

A two-day session of this committee was held in Boston on March 25 and 26, Chairman C. S. Ching, Boston Elevated Railway, presiding. The members present were E. E. Strong, Rochester, N. Y.; F. I. Hardy, South Bend, Ind.; W. J. Harvie, Syracuse, N. Y.; H. H. Hanson, R. B. Currie, and Edward Dana, Boston. The committee is making a study of the laws relating to employment and is planning a systematic program for the improvement of courtesy. These will be covered at length in the report to be presented at the 1915 convention.

NEW ENGLAND TRANSPORTATION COMMITTEE

This committee held its first meeting on March 16, those present being H. E. Reynolds, Boston, chairman; C. C. Wood, Springfield, Mass.; A. A. Hale, Boston; J. E. Johnson, Boston, and R. M. Sparks, Boston, secretary. It was decided that the plans as outlined by the director of transportation will be followed by the New England section and it is expected that a large number of local members will make the trip. A notice for presentation at the annual banquet of the New England Street Railway Club on March 25 was prepared. This called attention to the inducements and conveniences which will characterize the trip and gave the names of the New England committee members so that inquiries can be made of those conveniently located.

COMMITTEE ON LIGHTNING PROTECTION

A meeting of the Engineering Association committee on lightning protection was held in Pittsburgh on March 24 with all of the members present, as follows: D. E. Crouse, Annapolis, Md., chairman; F. R. Phillips, Pittsburgh, Pa.; E. J. Blair, Chicago, Ill., and J. Leisenring, Springfield, Ohio. C. G. Hecker, Pittsburgh, also attended part of the meeting. The following assignments were made, the individuals named to prepare sections of the report after correspondence with other members of the committee: Mr. Phillips, material of cores, location and size of car lightning arrester choke coils, also location, available types, and suitable methods of inspection of car lightning arresters; Mr. Crouse, car wiring with reference to the prevention of electrostatic and electromagnetic induction, and lightning arrester grounding, including size of ground wire, proximity of

other wires, and effect of steel cars on methods of grounding; Mr. Leisenring, available types of line lightning arresters and recommendations as to the desirable number per mile; and Mr. Blair, line lightning arrester ground connections, with regard to earth or rail connection or both. These topics were thoroughly discussed by the committee with a view to a logical development of the subject in preparation for the convention report.

DENVER TRAMWAY SECTION

The regular monthly meeting of Company Section No. 3 was held on March 18, with an attendance of 125. H. P. Fligg, chief of the coasting department, read the principal paper on the subject of "Coasting." This provoked a lively discussion.

PUBLIC SERVICE RAILWAY SECTION

On account of lack of space last week the March meeting of Company Section No. 2 was merely mentioned. The meeting was attended by more than 300 men, and talks were given by R. E. Danforth, general manager; Alfred Green, Galena Signal Oil Company, and H. H. Norris, ELECTRIC RAILWAY JOURNAL.

Mr. Danforth reviewed his own experiences in Buffalo and Rochester, calling attention to the fact that in the latter city seven new sets of motor equipment were required in ten years, owing to the rapid development of the railway motor between 1890 and 1900. He showed how this development work imposed heavy financial burdens on the electric railways of the country and intimated that the cost of this development is a proper capital charge. From the experience of the Public Service Railway he showed how, during seven years past, maintenance costs, even of old motors, had been reduced by such devices as impregnating windings with insulating varnish, slotting commutators, etc. He also gave figures comparing maintenance costs of different types of motors used in Rochester some years ago, indicating how rapid was the progress in perfecting mechanical details in motor construction. Mr. Danforth quoted a number of prices paid for repair parts of early motors and for complete motors, showing that not only were motors expensive, but the cost of the repair parts was excessive, due to the inexperience of the manufacturers.

Mr. Green's talk was an intimate personal account of troubles with early motors with particular reference to gears and controllers. He gave amusing details of the construction of gears with wooden centers and cast-iron rims, the wooden centers being necessary for insulating purposes. Steel rims were later shrunk on the wooden centers with great reduction in cost. His talk gave a vivid impression of the difficulties of keeping cars in motion in the early days, which difficulties are apt not to be appreciated by the rising generation. He closed by emphasizing the fact that troubles with equipment were farreaching in preventing regular operation and dissatisfaction to patrons.

Mr. Norris confined his attention to calculations of the energy required to bring cars to speed from rest on level track, grades and curves and to maintain speed, for the purpose of showing the relation of accelerating power to the necessary size of motors. The speaker and the audience worked the problems out together, using motor curves which were printed on the regular Public Service data-book leaves. The calculations were based on equipment used in Newark, so as to permit the results to be checked from the experience of the men present. The A. I. E. E. motor rating was explained and the relation of this rating to the all-day load of the motor was illustrated from the calculations.

New England Street Railway Banquet

Large Attendance at the Annual Meeting in Boston on Thursday—New Officers Elected

Between 600 and 700 members and guests of the New England Street Railway Club gathered at the Copley-Plaza Hotel, Boston, Mass., on the evening of March 25 for the fifteenth annual banquet of the organization.

As usual, the banquet was preceded by the annual meeting in the afternoon, at which Clarence E. Learned, of Boston, was elected president, succeeding John T. Conway, of Brockton, Mass. Other officers elected were: vice-presidents: Massachusetts, C. V. Wood, Springfield; Maine, A. H. Ford, Portland; New Hampshire, J. Brodie Smith, Manchester; Vermont, Frank C. Wilkinson, St. Albans; Rhode Island, A. E. Potter, Providence; Connecticut, R. W. Perkins, Norwich. H. A. Faulkner, of Boston, and E. P. Shaw, Jr., of Framingham, Mass., were re-elected secretary and treasurer, respectively. The executive committee consists of J. T. Conway, Brockton, Mass.; Harry B. Ivers, Boston; E. F. Flynn, Boston; C. S. Ching, Boston; J. E. Dozier, Lynn, Mass.; J. W. Belling, Boston, and A. A. Hale, Boston, the finance committee consisting of C. E. Learned, H. B. Potter and A. P. Emmons, all of Boston. A biographical sketch of the new president is printed on another page of this issue. At the close of the business meeting an informal reception was enjoyed in the corridors and lobby of the hotel.

At the banquet in the evening "safety first" was featured in the menu, which abounded in clever cartoons and quips sponsored by Secretary Faulkner. The outside cover bore a red, white and green shield—the original "safety first" appliance of primitive man, handsomely decorated with trolley cars rampant and other appropriate emblems. Inside the folder were a set of "safety first" banquet rules wittily paraphrased. Among these were the following:

"Avoid hasty movements. Watch out. Be sure of your seat before sitting."

"Be careful. When in doubt pick the fork on the outside and work toward the plate. Watch the man on the other track."

"Don't leave the hall while the speakers are in motion. Face the front."

"Safety first pays. Remember the names of the men you are introducing—or cough at the meeting points."

An attractive musical program was provided during the evening. A decided hit was made by the appearance of an East Indian crystal gazer whose "revelations" of the future contained many appropriate references to prominent members and their activities.

ADDRESSES OF THE EVENING

Mayor James M. Curley of Boston paid a high tribute to the safety work of the Boston Elevated Railway and to the personnel of the club. He emphasized the present serious situation in the transportation field with respect to the need of increased revenue and pointed out that the public fails to realize the rising cost of living to the railroads. The speaker recognized the need of higher fares, contrasting the difficulties of securing adequate income with the facility with which municipal and state taxes can be increased. "'Safety first'," said the Mayor, "should be extended to the stockholder's interests as well as to the life and pocket of the public." Closing, he said that he believed the railroad men of New England were competent to work out a solution of the present difficulties, including the invasion of the "jitney" bus, and voiced his purpose to see that so far as lies within his power, justice shall be accorded the railways.

The next address was delivered by Judge Thomas Duncan, chairman of the Indiana Public Service Commission. The speaker traced the legal development of the power of states to regulate common carriers from the early regulations of ferrymen, wagoners and common carriers by parliament to the present mode of regulation by states through their public service commissions. "The exercise of the right to regulate rates, and to require adequate service through the instrumentality of state control, is but a change of the form, and not a change in the character of regulation," he said, and "the order of a commission in fixing rates has the same force as a legislative act. Continuing, he said:

"The courts go very far to sustain an order of the commission. It has frequently been determined by the highest courts of the land, that the orders of the commission are final unless, (1) beyond the power which it could constitutionally exercise; or (2) beyond its statutory power; or (3) based upon a mistake of law. But questions of fact may be involved in the determination of questions of law, so that an order regular on its face may be set aside if it appears that (4) the rate is so low as to be confiscatory and in violation of the constitutional prohibition against taking property without due process of law; or (5) if the commission acted so arbitrarily and unjustly as to fix rates contrary to evidence or without evidence to support it; or (6) if the authority therein involved has been exercised in such an unreasonable manner as to cause it to be within the elementary rule that the substance, and not the shadow, determines the validity of the exercise of the power."

The speaker then quoted figures from the reports of the Interstate Commerce Commission showing the growth of the railroad business and investments therein, and then said:

"The present depression in the transportation business is not permanent, nor in my judgment is it due to governmental regulation. It is not confined to business regulated by the state. It prevails generally with varying degrees of violence. The people and the public service corporations are not enemies but friends. Our citizens know these splendid properties cannot be permitted to die of starvation without injury to all. It is the mighty task of the leaders of thought of this age to show the people a more excellent way. When the broadest publicity discloses a reasonable necessity for increased revenues the people will respond with a just—nay, even with a generous hand. But deception is dangerous.

"It is the duty of public service corporations to assist in restoring harmonious relations between the carriers and those they serve. He who engenders strife is an enemy to the prosperity of his business. With the coming of peace in the world prosperity may confidently be expected and the development of the country will have the opportunity to proceed along efficient lines."

The next address was by Chairman Fred J. McLeod of the Massachusetts Public Service Commission who referred to the Middlesex & Boston case as a declaration of policy on the part of the board. He predicted that within the next two years many more applications for increased rates will be presented to the commission and said that, generally speaking, these are likely to be granted. Mr. McLeod said in part:

"The troubles of the railways are not due to state or federal regulation. This has in the main been constructive. The commission is not responsible for the adequacy of rates. That rests with the companies. In general, my conclusion is that the rates now charged by Massachusetts street railways are insufficient to enable the companies to give the kind of service the public has the right to demand, to adequately conserve the property and to provide for depreciation. The commission is not in an enviable position, but the differences between the interests of the railways and of the public are largely superficial. The companies are run honestly and it would be to the highest degree imprudent to let the street railways of Massachusetts get into the unfortunate position of the Boston & Maine (steam) Railroad."

General William A. Bancroft, the next speaker, contrasted the difference between private income opportunities and the restrictions placed on public service corporation revenue and declared that unless responsibility for income is recognized as a necessary function of governmental regulation, then the latter becomes a failure. Capital furnishes equipment; labor operates it, and income should support both, as well as provide for maintenance, depreciation, obsolescence, attracting and supporting new capital. The requirements of good service and adequate wages are generally conceded, but the element of income needs more consideration. Government now determines the income and, with it, should assume the same responsibility formerly borne by those who fixed the revenue. The investor is entitled to as much consideration as are labor and the public. Said the speaker: "Government, to use the language of the President of the United States, must play the whole game and play it according to the rules. It cannot leave out any part. It must provide for capital, both for new and for old, as well as for service and for labor. It must raise rates if necessary, just as managers did before their power to do so was taken away."

General Bancroft emphasized the Middlesex & Boston decision as one which completely recognized the principle that income must be adequate to meet the conditions which it is its function to support. In conclusion he said: "In the expressive phrase of the day, it is 'up to' the governments of our respective states and to the government of the United States to provide for income. If government control fails to provide for income, then government control is a failure."

President C. Loomis Allen of the American Electric Railway Association, the next speaker, said that the survival of the industry, extensions into new territory, and increased facilities require a change in the public's attitude. A greater confidence must be inspired in the purchase of electric railway securities to enable the necessary expansion to be made. Self-education as to the problems of the industry and the education of employees are essential. "Tell your employees in language that will be understood how much money you take in and how these revenues are disposed of," said the speaker. He advocated giving employees a correct understanding of the profits that are earned on each nickel received. Many employees beside the public at large believe that these profits are very great. Financial facts should be set forth in plain and terse language, avoiding technicalities and accounting terms. The public wants to know about the expenditures from revenue. It wants to know the amounts paid in salaries, labor, and for the purchase of material and supplies; the amounts paid out in the settlement of injuries and damage claims, and the expenses connected therewith; the amounts of legal fees, of various forms of taxation, and to what extent the municipalities are benefited by these sums. The companies are interested in letting the public know the outlays in interest on funded and unfunded loans, the payments in dividends, who the stockholders are and the amount of stock each holds. A great service can be done the industry by furnishing employees with the details of operation, requesting them to tell the story to their neighbors, fellow-workers and friends. No expenditure and but little time is required to give such information in simple form. Misunderstanding has arisen in the past on the

part of the public through failure to make proper use of employees as avenues of truth distribution.

Frank J. Hedley, vice-president and general manager of the Interborough Rapid Transit Company of New York, was the last speaker. He touched upon the magnitude of the electric passenger transportation problem in New York City. About $300,000,000 is now being expended in the construction of new rapid transit lines. When these improvements are completed, the maximum ride on a 5-cent fare will go up from 17 to over 26 miles. Mr. Hedley referred to the great benefits of the open shop method of operation and emphasized the efforts of the company to insure the satisfaction of employees and equal opportunities of advancement to all men of ability. Closing, he deprecated misuse of opportunities of the press and advocated a square deal in newspaper columns for railways.

C. S. Clark, Boston, and Harry B. Ivers, Boston, were, respectively, chairmen of the reception and general banquet committees.

COMMUNICATION

Meters and Men

SANGAMO ELECTRIC COMPANY
CHICAGO, ILL., March 18, 1915.

To the Editors:

In the editorial "Meters and Men," in the Feb. 27 issue of the ELECTRIC RAILWAY JOURNAL, the editor, after cautioning against the use of average consumption per car-mile records for determining motormen's relative performance in car operation without first carefully analyzing and subdividing the different service conditions, suggests the development of some sort of stop-recording device for simplifying the work.

It is the writer's opinion that the adoption of a device of this nature on any system would tend to defeat the real purpose of the car meters, the attainment of economy of operation, by putting a premium on the number of stops made by the motormen. Where the number of stops are considered in the motorman's average consumption rate, there would be an incentive for all the men, no matter whether they had a low or high consumption, to make the maximum number of stops, or even more if possible, thus reconciling their consumption to an unnecessarily extra number of stops.

The argument in favor of a stop-recording device must support the contention that the average car-energy consumption per mile is proportional to the number of stops per mile. This means that there must be a fair uniformity of energy consumption per stop, or rather between stops, over the test period. Yet, on a city system it is evident that the average consumption per stop per mile for a car crawling along behind wagons and slowly moving traffic will be far less than the average for a heavily-loaded car that makes from ten to twelve stops per mile at evenly divided intervals. Therefore, for fairness, it is either necessary to know the exact kind of stops, namely, to classify the stops according to the amount of energy used in accelerating and running between stops, or to take the test over a comprehensive period, to eliminate such variables, and to enable all men to make nearly an equal number of similar stops. To eliminate the variable representing the number of stops would be in fact eliminating the necessity of a stop-recording device.

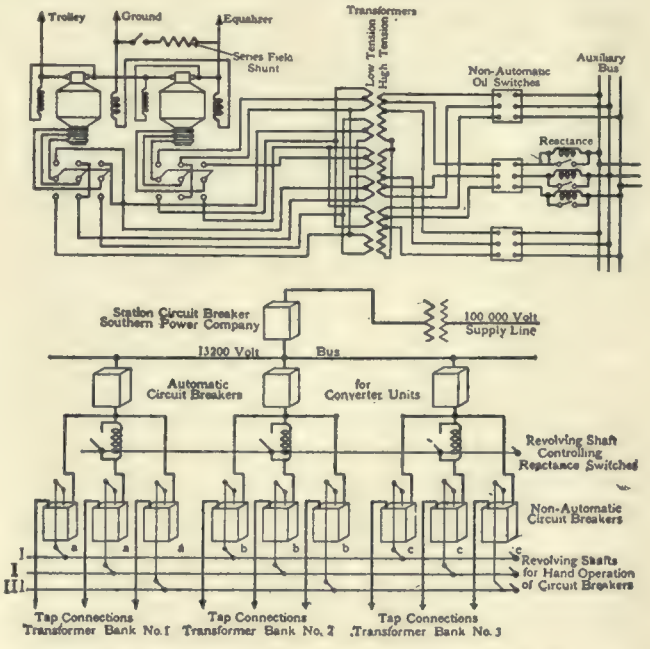
There will be a difference in average consumption per stop per mile on different lines with the same type of car over a reliable test period, depending on conditions of local traffic, schedule, etc., just as there will be a difference in average consumption per mile for the same reasons, thus necessitating the separate classification of the results of the different service conditions, with either system. So that while the stop-recording device might apparently be of advantage in showing the total number of stops that any motorman has made with a given consumption, still the far more important variable representing energy used between stops has to be eliminated by the law of averages and the separate classification of service conditions.

It is true that a word of caution is due with regard to the use of meter records for comparisons of motormen. The different types of cars must be divided into car classes and the different service conditions divided into service classes, and the results in each car-service class should be figured separately in average consumption terms. Then each man's results in the different classes can be combined by percentage figures. It is not difficult properly to classify the different service conditions, and in this regard it is advisable to oversubdivide rather than otherwise, as later on similar averages of service classes can be combined and the total number of car-service classes reduced appreciably. Above all, no figures should be accepted until it is certain that they are reliable and have all variables but the ones of relative performance of motormen eliminated by having been taken over a sufficiently long period. Because a ball player has a batting average of 1.000 for two games is no sign that he is a great batsman, and similarly the record of an extra man on a tripper or special, over the rush hours of the day, is no criterion of his ability.

C. H. KOEHLER.

Sixty-Cycle Rotary Converters in Series in 1500-Volt Service

In the April issue of the *Electric Journal* Nicholas Stahl gives operating details of the rotary converter equipment of the Piedmont & Northern Railway, installed last year. Both motor-generator sets and rotary converters are used in the substations, but in the Spartanburg substation each unit consists of two sixty-cycle rotary converters connected in series on the d.c. side and mounted on a single bedplate. As the voltage on the substation was liable to considerable variation due to



SPARTANSBURG SUBSTATION—A.C. AND D.C. CIRCUIT DIAGRAMS SHOWING TRANSFORMER SECONDARY MULTI-TAP CONNECTIONS

(The lower is a straight-line diagram)

the length of the transmission system and the varying load demand upon it, special provision was made for adjusting the secondary voltage of the transformers. The arrangements for connecting different taps in the 13,200-volt transformer primaries to the auxiliary busbars are shown in the diagrams which appear on page 633.

The transmission voltage to the substation is 100,000 and it is reduced to 13,200 in outdoor transformers. Inside the substation are nine transformers, each of 167-kva capacity, arranged in three banks, with star-connected primaries and delta-connected secondaries. These reduce the voltage to about 460 for the rotaries. There are three primary taps on each transformer, each made through an oil switch, the center or normal tap being provided with a preventive coil and a disconnecting switch. This arrangement provides for shifting the taps in service, the "disconnect" being open while two of the switches are closed in the process of transferring taps. The taps provide for voltage 90, 100 and 110 per cent of normal. The secondaries of these transformers are double, the two windings supplying respectively one phase of each of the two rotaries forming a pair.

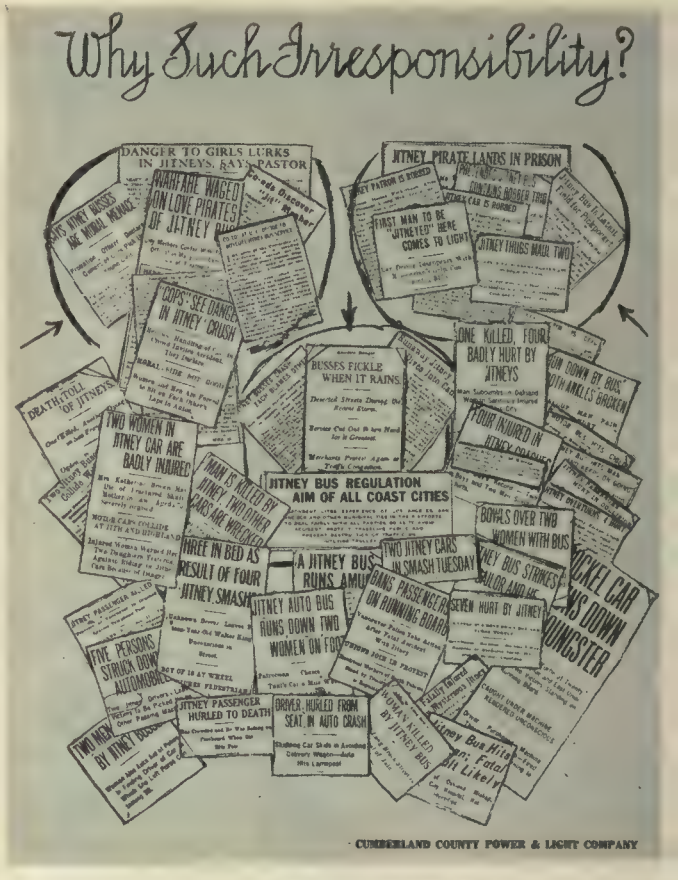
The a.c. circuit breaker for controlling a transformer bank is provided with a low-voltage release and pallet switch. On failure of the alternating voltage the circuit breaker will trip out and the pallet switch, being connected to a non-voltage or shunt trip coil on the d.c. circuit breaker, will trip out the d.c. end of the rotary, completely isolating it. This prevents damage due to a.c. power coming back when the machine is out of phase and nearly at rest. As the substation is also liable to receive power over the d.c. trolley, d.c. reverse-current relays are installed on the machine panels to operate when the rotaries tend to reverse themselves. These short-circuit low-voltage coils on the a.c. circuit breakers and cut out the sets. Additional circuit breakers are placed on the negative side of the d.c. circuit to protect the "low side" machine in case of a short-circuit around the "high" machine. These circuit breakers, with the equalizer switches, are mounted on inclosed panels placed between the machine and feeder panels.

To protect the substation the feeders are not tied directly to the trolleys at the substation but are carried about a mile down the line. Flash-overs have been extremely rare and then of no serious consequence, and no trouble has been experienced through reversal of polarity of d.c. generators elsewhere on the system, which might have been caused by rise of voltage on the d.c. side of the rotary converters when a rise occurred on the a.c. side.

Ammunition in the "Jitney" War

The accompanying illustration shows an advertisement entitled "Why Such Irresponsibility?" originally inserted in the daily papers of Portland, Ore., by the Portland Railway, Light & Power Company and later, through the courtesy of that company, published in some of the daily papers of Portland, Maine, by the Cumberland County Light & Power Company.

As the other side of any question is interesting, however, an advertisement of a Chicago dealer in automobile supplies is reproduced also. The advertiser in this case is obviously a frank soul, for his plea to the casual reader to spend a few hundred dollars and earn $100 per week sounds enticing. The statement of profit would, of course, be more convincing if the dealer had taken advantage of the opportunity himself, but as a possible insight into one of the causes of the remarkable growth of the "jitney" craze the advertisement is enlightening. Incidentally, it might be added that in the many statements which have been received at the office of the Electric Railway Journal in regard to the profits of "jitney" bus drivers, none has ever claimed



"JITNEY" WAR AMMUNITION—NEWSPAPER HEADINGS ON "JITNEY" MENACE

Be the First to Operate a
"JITNEY"
BUS LINE

Why work for $25 a week when on an investment of a FEW HUNDRED DOLLARS you can start in business and make $100 a week?

New and used autos at prices never before offered. You can convert any of our cars we sell into a "Jitney" bus. Consult us—we will show you how to do it.

Limousine, coupe and up-to-date fore-door touring bodies at your own price.

AUTO SUPPLIES—TIRES

Accessories and radiators for all cars at 50 cents on the dollar.

Our No. 7 Price Wrecker covers every automobile want. Send or call for it. Save money.

World's Largest Dealers
TIMES SQUARE AUTO COMPANY
1210 Michigan Avenue
Also Fifty-sixth Street and Broadway, New York.

"JITNEY" WAR AMMUNITION—ADVERTISEMENT IN CHICAGO PAPERS

the gross profits of $100 per week. The most extravagant claim of net receipts among them up to this time has been limited to about $30 per week in cases where the driver neglected all expenses except those for gasoline and tires.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

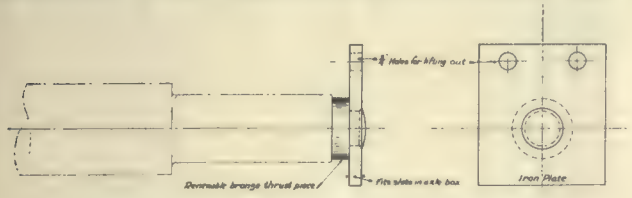
Thrust Plate for Worn Car Axles

BY "VULCAN," A.M.I.C.E., A.M.I.E.E., ENGLAND

A. R. Johnson's article on "Case-Hardened Collar and Welding Reclaim Worn Button-End Axles," on page 294 in the issue of Feb. 6, raises a subject of considerable interest, inasmuch as all who have had charge of the maintenance of rolling stock have at some time or another encountered the trouble referred to.

Mr. Johnson refers to the excessive wear as having taken place after his company had commenced to use check (or keep) plates made of hard bronze, but I should imagine that even when the plates were made of a softer metal the axle wear in the check grooves was more than that which occurred at other parts of the axles. In England I have come across scores of cases where an otherwise sound axle has been cast aside as useless, simply because the sides of the check grooves have worn to a bad shape; the plates are generally of fairly hard bronze, but soft metal is still quite common.

Considering the great pressures which are impressed on the sides of the axle grooves when a car takes a curve, at the high speeds so common nowadays, and remembering at the same time that the whole load is



RENEWABLE BRONZE THRUST PIECE FOR AXLE

spread over only about one-half of the full circle, it is not reasonable to expect such thrust faces to keep their normal shape for very long. Although there are two check plates per axle it can practically be assumed that the total side pressure is at any instant carried on one plate only per axle.

Take a common English case, namely, a double-deck car weighing 13 tons, on a four-wheel truck, traveling round a curve of 50-ft. radius at say 10 m.p.h. (14.6 ft. per second). Since the street track, as a rule, has no super-elevation, the centrifugal force causing pressure against the check plates will be:

$$F = \frac{W \times V^2}{g \times R} = \frac{13 \times 2240 \times 14.6 \times 14.6}{32.2 \times 50} = 3860 \text{ lb.}$$

where F = centrifugal force in pounds.
W = weight of car in pounds.
V = velocity of car in feet per second.
g = gravity acceleration = 32.2 ft.p.s.p.s.
R = radius of curve in feet.

This force is imposed on two check plates, one on each axle, and as the side-bearing area per plate is usually about 1.95 sq. in. the pressure intensity is

$$\frac{3860}{2 \times 1.95} = 990 \text{ lb. per square inch.}$$

This figure is, of course, very high indeed for the class of bearing under notice, but even this amount will be considerably exceeded when the car takes a sudden change of direction, as when taking switches and crossings and when nosing occurs at high speeds.

The case-hardened collar described by Mr. Johnson will undoubtedly effect a very considerable improvement. However, I think that the arrangement which I devised and used on two large systems having between them more than 600 cars, goes one better still.

The arrangement eliminated altogether the horseshoe type of check plate. In place of this we adopted a thrust plate which rubs against the end of the axle. To allow existing axle boxes to be used, the old axles with worn grooves were cut off in the lathe, level with the inside groove face, so that when in position there was just the necessary space available to allow the insertion of a plain solid bronze plate abutting on the axle end.

The check plates are reversible. For a 3-in. axle end they have a thrust-bearing area of nearly 7 sq. in. as compared with less than 2 sq. in. for the old arrangement. As can be expected, the wear on both axle and plate is very small indeed. They have been used on both single and bogie trucks (in the latter case for both driving and trailer axles), and in every case they have proved their superiority over the old pattern.

A later improvement greatly reduces the amount of bronze, which metal somehow or other seems to disappear very quickly when not in actual use on the cars. The accompanying sketch fully illustrates the revised check plate, and since all particulars are given thereon no further description is necessary.

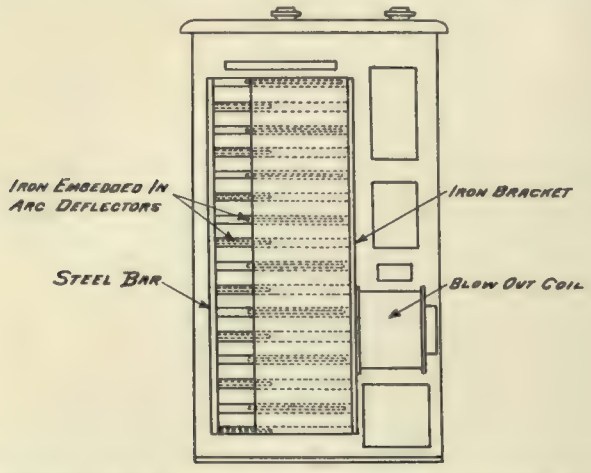
Equipment Defects—Controller Blow-Out Coils—II

BY C. W. SQUIER, E. E.

Directed Flux Blow-Out.—In order to direct the magnetic field so that the lines of force would pass across the contacts in a direction parallel to the shaft and so blow the arc away from the drum instead of against the arc deflectors, the Westinghouse Electric & Manufacturing Company developed what may be called the "directed flux blow-out." An accompanying illustration shows this arrangement as applied to the No. 210 controller. A cast-iron bracket runs down the blow-out coil side of the arc shield, and a facing is provided for this bracket to make contact with the core of the blow-out coil. The arc shield is fastened to this bracket and swings with it. The individual arc deflectors are made of pressed asbestos or Ambroin, and pieces of sheet iron are imbedded in them. These deflectors and iron plates are so arranged that every alternate one has the iron projecting backward to the bracket on the blow-out coil side, while the iron in the remaining arc deflectors consists of short pieces projecting down to a steel bar which runs down the front and on the lower edge of the arc shield. The magnetic circuit is then as follows: From the core of the blow-out coil lines of force enter the bracket at the back and pass to the iron plates in the arc deflectors and to one side of the contact fingers. Then the lines cross over the intervening space across the contacts to the short pieces of iron in the adjacent arc deflectors and from these short plates down to the steel bar running in front of the arc shield and to the controller frame, and so back to the blow-out coil core. In passing from one arc deflector

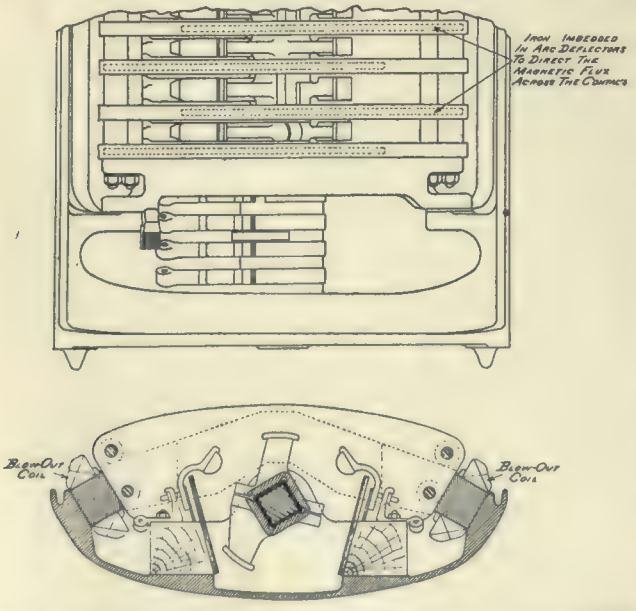
to the adjacent ones the lines of force cross the fingers and contacts in a direction parallel to the controller shaft, so that any arc formed by the opening of the controller circuit is lifted away from the drum. This type of blow-out overcame the disadvantage of having the arc blow against the arc deflectors, but as some contacts were a greater distance from the blow-out coil than others these had a less efficient blow-out.

Field Type of Blow-Out.—A further development of the directed flux blow-out overcame the disadvantage of



WESTINGHOUSE NO. 210 CONTROLLER WITH DIRECTED FLUX BLOW-OUT

a less effective blow-out for the contacts most distant from the blow-out coil. This was brought about by using two blow-out coils, one on either side of the controller, running the entire length of the contacts. It is known as the "field type blow-out" on account of its resemblance to the field of a two-pole motor. An accompanying illustration shows the arrangement of the coils, which are so wound that the faces of the pole



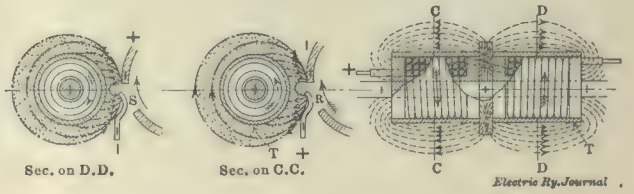
WESTINGHOUSE T-1 CONTROLLER WITH FIELD-TYPE BLOW-OUT

pieces are of opposite polarity. In the arc deflectors are imbedded iron plates which extend about three-quarters of the distance from one pole piece to the other. Each succeeding arc deflector is reversed so that the iron plates in adjacent arc deflectors overlap through the center of the controller, and the contact fingers are placed in this space. The path of the magnetic flux is from one blow-out coil core through the iron plates which rest against this face to one side of the contact fingers, then across to the plates in the adjacent arc deflectors and through these to the blow-out coil core on the opposite side of the controller. By using coils which extend the entire length of the contact portion of the drum an absolutely uniform field is produced at the various contacts to produce a correspondingly uniform blow-out. The location of the coils at the side of the controller at a distance from the points at which arcing occurs leaves them safe from injury and gives an uninterrupted view of the contacts, which is desirable for inspection purposes.

Another desirable feature of this type of arc shield is that it permits the elimination of all screws in the deflector plates. Such screws promoted splitting of the plates and proved a constant source of trouble in all the previous types of blow-outs discussed. The deflector plates of this type are bolted together with iron rods and separated by fiber spacing blocks so that they are held firmly together with no tendency to split, the whole forming a very substantial construction. In a later design the holes for the rods are slotted so that any single arc deflector can be removed and replaced without disturbing the remaining ones.

The Metallic Shield Type of Blow-Out

A somewhat unique but efficient type of blow-out is used in the controllers manufactured by Dick, Kerr &



DICK-KERR METALLIC SHIELD BLOW-OUT

Company, Ltd., England. This is shown in an accompanying illustration and is called the "metallic shield" blow-out. It consists of an iron core running the entire length of the controller drum on the side where the contact fingers are located. Several different coils of wire are wound about this core and arranged so that there are in alternation a series of positive and negative poles along the length of the iron core. These poles are at such locations that the direction of the magnetic flux across the contacts will draw the arc toward the coil. A copper metallic shield surrounds the blow-out coils so that, when the arc is broken, it is drawn around the circumference of this shield until a point is reached where it is broken without damaging results.

This feature of blowing the arc against copper shields or tips which the arc can follow along until it is spread out and then disrupted without damaging the contacts has been used very extensively in multiple-unit controllers by applying arcing horns to the unit switch contacts.

An important safety feature of the metallic shield blow-out is that the circuit to the blow-out coil and controller fingers is broken whenever the arc shield is swung back for inspection purposes. The danger of an accident due to a repairman leaving the circuit breaker in while inspecting the controllers on a car is thus reduced.

Individual Blow-Out Coils

The latest General Electric controllers have individual blow-out coils and arc chutes for each finger or group

of fingers instead of a single blow-out coil for the entire controller, as was formerly used. These coils have steel cores, and the steel flanges which are riveted to these cores are in turn fastened to the finger bases. Steel plates are also imbedded in the arc deflectors so that they direct the lines of force through the arc chutes in a direction parallel to the shaft. This insures a very efficient blow-out and minimizes burning and the consequent repairs to contacts and fingers.

Motor Cars Supplant Horses in Vienna for Drayage

BY LUDWIG SPÄNGLER, DIRECTOR VIENNA MUNICIPAL TRAMWAYS

Owing to the war most of Vienna's heavy automobile trucks, horses and vehicle operators have been drawn upon for military duty, thereby making difficult the



WAR-TIME TRANSPORT IN VIENNA—PULLING COAL WAGONS ON A CURVE

cheap and skilful transportation of freight throughout the city. We are therefore adapting our electric railways for that purpose so far as possible. The same condition holds true also throughout Austria-Hungary.

A most important new field for the electric railway is the hauling of coal and coke from the steam railroad warehouses and gas plants to large city depots and retail dealers. In Vienna the direct use of the electric railway for this purpose is often impracticable because the coal is delivered to several widely-scattered terminals and the coke also must be taken from two different



WAR-TIME TRANSPORT IN VIENNA—ATTACHING AN EMPTY COAL WAGON

gas plants. Most of these sources of fuel supply are not accessible directly to the electric railway tracks. To build sidings and special fuel cars, including weighing facilities, would have called for a prohibitive expense, aside from which the retail fuel supplies in Vienna would have been exhausted long before new equipment could be furnished and installed.

To meet the emergency created by the war the writer suggested that the coal and coke be carried in the same wagons as before, but that motor-car haulage be substituted for horses on reaching the car tracks. The great reduction in horse mileage thus obtained would make it possible, of course, to get along with very few animals.

Following the writer's suggestion, the wagons are loaded and weighed at the supply points, whereupon they are drawn by horses to the nearest street railway. There the horses are unhitched and reharnessed to take back the empties. In the meantime the motor cars draw the loaded wagons to the desired distributing centers. In some localities the horses draw the wagons to the coupling place in the daytime, where they are left for the night drayage by the cars.

The short wagon hauls to the tracks are usually in level territory, whereas in an extended trip through Vienna it would be impossible to avoid quite a number of grades.

The coal wagons are attached to the standard draft rigging of the motor car by means of a coupling rod extended from the underside of the wagon axle. A second coal wagon may be attached to the first. Vienna coal wagons are usually of a slightly narrower gage than our tracks. On tangents, therefore, only the wheels of one side run on a rail, while the other two



WAR-TIME TRANSPORT IN VIENNA—PULLING COAL WAGONS ON A TANGENT

wheels run on the paving, but this causes no harm. If the service was to be continued for any length of time it would, of course, be natural to use wagons with the same gage as our tracks. However, we find that a motor car and wagon will run very well even on our shortest curves. The only precaution necessary is so to regulate the coupling rod that the wagon does not swing too far to one side.

The permissible speed of a train is about 3.7 m.p.h., which is about twice that of a horse-driven wagon. The wagons make the extra speed without damage or excessive noise. Of course, even this rate of speed is far below that of our passenger cars, which average about 8 m.p.h. Consequently, they cannot be interpolated with the short headway service of the day, so that all of this work has to be done at night.

The motor cars are furnished with extra heavy resistors to permit slow-speed operation. They make several trips a night, hauling an average load of 9 tons of coal per trip. In view of the short period for which this kind of transportation was devised, the cost of operation is very reasonable indeed and with no addition at all for new equipment. Our experience in this connection, and in the handling of freight generally during war times, proves the adaptability of the electric railway for new and important duties.

Points on the Installation and Removal of Pinions—I

BY R. H. PARSONS, ELECTRICAL FOREMAN

The correct installation and removal of pinions is a part of maintenance work which does not always receive the attention that it deserves. The old-time combination of a heavy sledge and a husky man is still in force in too many shops. In such places the pinion is usually placed on the shaft and then driven home by one man, who hammers against an iron block (or another pinion) held against the pinion by a second man. If the men fail to start the pinion straight they force it along anyhow, often dragging the surface of the shaft and destroying all possibility of a tight pinion.

After the pinion is driven as far as it will go the nuts are placed on the shaft and tightened again, with brute force acting on the end of a long wrench. The wonder is that more pinions are not broken and more threads stripped, especially if the workman stands upon the wrench and jumps on it until the nut will move no more. That ten minutes of such strenuous effort will not prevent the pinion from working loose seems incredible to the sledge wielder. Neither is it the least bit probable that he will detect cracks in the metal caused by his strength and ignorance. He would be astonished to learn that the pinion may drag enough of the metal of the shaft to shim itself tight temporarily but that it will loosen quickly in operation.

Conditions are even worse when a pinion is to be removed. Granting that the pinion has been in service for a year and that it was properly installed at the time, it need not be assumed that it is on tight and will require some force to remove it. Removal often causes serious damage, not only to the pinion itself but to the other parts of the motor, bringing such results as bent or broken armature shafts, broken frame heads and broken bearings. Sometimes, even, it is necessary to cut the pinion before it can be removed.

One of the difficulties encountered in devising an efficient pinion puller is due to the condition that the designers of many of the later type motors intentionally or otherwise did not pay particular attention to the fact that pinions do have to be removed. This is indicated by the fact that they did not leave space enough between the pinion and bearing or housing to apply the jaws of a pinion puller of sufficient strength.

Pinion pullers have been adapted for such motors by making them with jaws which have teeth to grip the side of the pinion. These jaws would do the work if the pinion is of soft material and not too tight on the shaft, but the newer pinions of high-grade surface-hardened steel do not allow the teeth to make an impression. As there is not room behind the pinion for a substantial jaw, the question arises: How are we to pull this pinion without damage to the motor and save the pinion if it is not worn beyond the limit? Furthermore, even if the pinion could be pulled with this outfit it might be cut so badly by the teeth that its further use would be out of the question.

Again, where the design of the motor does permit the use of a pinion puller which will clutch behind the pinion, the next points to be determined are: How much force must be exerted on the puller; how is this force conveyed to the pinion, and will the puller or the pinion give way first? Did you ever see four or five men tugging at the bar and turning the screw of a pinion puller, with one man using gentle persuasion on the pinion in the form of a heavy sledge?

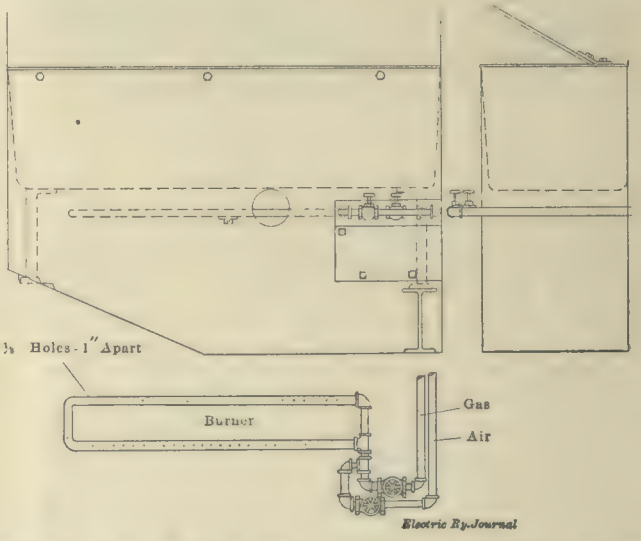
Some pullers are constructed with a screw placed against the end of the armature shaft and operated with a long lever. Others have a screw and eccentric so arranged that the screw will take up the slack. The movement of the eccentric is intended to remove the pinion. Still others use the same principle but are operated as hydraulic jacks. In most instances 40-tons or 50-tons steady pressure would be required to remove a pinion. Yet I have seen a hydraulic pinion puller rated to exert a force of 100 tons give out trying to pull a pinion.

Lightness and portability are other problems that the designer of a good pinion puller must face because pinion work should be the duty of one man, not of half the force. The pinion puller should be brought to the motor, instead of transporting the armature or motor to the pinion puller.

Some day may see a pinion puller which will fill all requirements—one that will pull the pinions without damage to shaft, bearings or pinion. In the meantime, however, we must remove and replace our pinions when necessary. The following paragraphs may be found to embody a few helpful hints taken from every-day practice.

HEAT FOR MUSCLE IN PINION INSTALLATION

As a modern pinion properly installed will give long service and as the modern motor itself will give a very high mileage before overhauling, every endeavor should be made to get from the pinion a mileage between overhauls equal to that of the motor. We cannot afford to bring a car into the shop just to replace a pinion. Therefore the installation of pinions by brute strength should be abandoned in favor of more scientific methods.



WATER TANK FOR HEATING PINIONS WITH GAS AND AIR MIXTURE

The heating of the pinion to a moderate degree before placing it on the shaft is approved by the best authorities because the contraction of the metal when it cools is sufficient to make the pinion tighter on the shaft than is possible by driving.

The recommended practice is to place the pinion for one hour in water kept at its boiling point, 212 deg. Fahr. In this bath the metal will expand uniformly to a size which will allow the pinion to be placed on the shaft as far as the design requires. The increase in the inside diameter of a pinion for a 65-hp motor when placed in boiling water for one hour is approximately 0.0045 in.

Immediately after removal from the water the pinion is placed on the cold armature shaft, pushed as far as it will go by hand and then driven home by striking its wooden block facing with a light hammer. Next, the

nuts are screwed to the shaft and tightened. The pinion guard is then struck a few more easy blows with a light hammer before the nut is tightened again. A short wrench with a handle 3 ft. or 4 ft. long is the only tool that is necessary, and this can be handled by one man. Neither the pinion nor the motor has been subjected to heavy blows or damage of any kind. The pinion shrinks back to its normal size, and when cool it is tight.

The cut on page 637 represents a tank heated by a combination of gas and air. This tank is very convenient for heating pinions. The one shown was an old cast-iron watering trough for horses. It was part of the equipment used in the maintenance of horse cars, but was readily adapted for electric car maintenance. It is about 3 ft. long, 2 ft. wide, and 1.5 ft. deep. It is mounted on an iron frame and fitted with an air and gas burner, as shown on the same sketch. Covering is provided in front and on the sides to protect the workman's clothing from the flame, and an iron top is used to confine the heat. Of course, pinions may also be heated by steam or electric ovens, but the water bath has been found to answer the purpose best. In the second article the removal of pinions will be discussed.

Headlight Test at St. Louis

An instructive comparison between arc headlights and incandescent headlights was recently made by the United Railways of St. Louis. The constantly increasing installations of high-efficiency incandescent headlights to replace arc lights suggested a competitive test between the railway's present equipment and the "Golden Glow" incandescent headlights. Some months earlier the latter lamps had been installed before the advent of concentrated filament tungsten bulbs. With the perfection of tungsten bulbs it was decided to try both the interurban and city type "Golden Glow" headlights on a car also equipped with the regular semaphore lens incandescent headlight and the 4½-amp arc. The test was conducted by M. O'Brien, master mechanic, the electrical engineer and the district superintendents of the railway, and Frank O. Grayson of the Esterline Company.

As reported by the company, the first run was made on the Hodiamont line. This is the old "Suburban Line" which runs about 8 miles from one end of the city to the other. The greater part is on poorly-lighted right-of-way. In fact, there are no lights except at street crossings. On this line the 4½-amp arc headlight has been used regularly.

The test was made on a rainy, misty night. The first headlight tried was the T-128 interurban lamp with 94-watt bulb. This lamp gave far greater illumination than was desired. Hence the No. 95 headlight with 46-watt bulb was put in place. This lamp gave a better penetration than the 4½-amp arc, and yet reduced the power consumption from 2.7 kw to 46 watts.

Then followed this interesting experiment: The arc lamp was lighted and when the "Golden Glow" headlight rays were thrown on top of the arc lamp rays the illumination of the latter lamp was lost almost entirely.

After a general conference it was decided to recommend the SM-95 headlight with 46-watt bulb for the Hodiamont line, burning in series with two circuits of 23-watt bulbs within the car, and the same style, but with a 23-watt bulb, on the purely city lines. As a result of this test the railway placed an order for 100 headlights for immediate delivery.

New safety-first signs to be placed in the yards, offices, carhouses and shops are being considered by the safety-first committee of the United Railways.

Tests of a 500-Hp Diesel Engine at Auburn, N. Y.

The McIntosh & Seymour Corporation, Auburn, N. Y., announces that on Jan. 11 it made five tests upon one of its 500-hp Diesel type engines. According to these tests the fuel oil consumption of the engine per brake-hp-hr. was 0.407 lb. at full load, and this was very little exceeded at four-fifths load. The consumption at one-half load was equal to that generally reckoned by the average engineer when estimating for full load conditions. These results naturally are considered to be exceptionally fine. Abstracts of the engine test and fuel analysis follow:

REPORT OF TEST MADE JAN. 11, 1915

Type of Engine, 4-A-38; Number, 1542; B.HP 500; R.P.M., 165; Cyl. Diam., 18⅞ in.; Stroke, 28.347 in.; Kind of Fuel, Fuel oil.

Test number	1	2	3	4	5
Load per cent of rating	113.4	100.4	79.4	52.4	25.2
Number of r.p.m.	171	165	172	174	170
Brake-hp $= \frac{W \times N}{K}$	567	502	397	262	126
Test began	8:15 a.m.	1:20 p.m.	3 p.m.	4:30 p.m.	5:24 p.m.
Test ended	8:45 a.m.	2:20 p.m.	4 p.m.	5 p.m.	5:54 p.m.
Fuel consumption during test, lb.	115.0	204.7	163.8	68.9	41.1
Fuel consumption per b.hp hour, lb.	0.405	0.407	0.412	0.449	0.652
Injection pressure, lb.	925	925	815	785	775
Exhaust gas appearance	Clear	Clear	Clear	Clear	Clear
Inlet temperature of cooling water, deg. Fahr.	56	56	56	56	56
Outlet temperature of cooling water, deg. Fahr.	145	147	145	147	150
Temperature in testing room, deg. Fahr.	62	62	62	62	62

ANALYSIS OF FUEL OIL FROM INDIAN REFINING COMPANY

Gravity	60 deg. Fahr., 0.8550 per cent
Flashing point	190 deg. Fahr.
Burning point	246 deg. Fahr.
Tar test	Negative
Water	0.051 per cent
Sulphur	0.187 per cent
Carbonization	6.4 per cent
Acidity	Trace
Heat value	19,266 B.t.u. per pound 137,463 B.t.u. per gallon

Transformer Blower of 40,000 Cu. Ft. Capacity per Minute

The Buffalo Forge Company, New York, has recently installed an unusually large fan for cooling air-blast transformers at the Blue Island power station of the Public Service Company of Northern Illinois. The installation was made under the direction of Sargent & Lundy, engineers. It consists of a direct-connected blower handling continuously 40,000 cu. ft. of air per minute at 70 deg. Fahr. and 29.92-in. barometer, with a static increase in pressure of 2.6 in. water gage. The blower is direct connected to a 30-hp, twenty-five-cycle, three-phase, 470 r.p.m. GE motor. Aside from the size of the unit, the interesting feature is the operating speed. Most transformer cooling units are 20,000 cu. ft. per minute capacity or below, and although direct connection is desirable, it has heretofore involved prohibitive expense for the slow-speed motors necessary on larger units. The blower in this case is a turbo Conoidal high-speed type, such as the Buffalo company has been using in connection with motor and steam turbine-driven forced-draft units for underfeed stoker work. Although the air pressures required for cooling air-blast transformers are much less than for stoker work, the speed of this fan is high enough to permit the use of a motor at a price which is not excessive. The fan is of the multiblade type with compact housing. It has a static efficiency of 60 per cent, and requires 27 brake-hp.

Impregnation Saves Copper and Repairs

The Metropolitan West Side Elevated Railroad several years ago used approximately 3000 lb. of copper wire a year in rewinding the field coils of air compressors. Shortly after the vacuum impregnating process was introduced, this company tested several impregnated field coils to determine the relative merits of the impregnated and the ordinary untreated coils. The impregnated coils were placed in the same service as the untreated ones. Within a year the compressors containing these test coils came in for repairs, and examination showed that the coils which were in perfect condition were the impregnated ones, and they were adopted as standard.

Since the company began to use the impregnated coils, approximately five years ago, no copper has been required for repair work on compressor field coils. In the case of large motor field coils, where high temperatures would shrink the insulation on the field, resulting in a loose field coil which required rewinding, the conditions are similar. The average cost of rewinding and replacing large field coils was approximately $50 per motor. With impregnated coils the field winding is tightened without rewinding, effecting a saving of approximately two-thirds of the former cost, to say nothing of the elimination of many "shorted" field coils.

Emergency Lighting Magnet Switches

A recent development in automatic switches for use when two sources of current potential are available in subways and other places, where the exigencies of the service are such that an interruption of lighting service might produce serious results, is shown herewith.

This device consists of two magnet-operated switches with a mechanical interlock that prevents the closing of both switches at the same time, and the magnetic feature includes an automatic device that causes the opening of one switch and the closing of the other on a potential drop of predetermined value. The switch



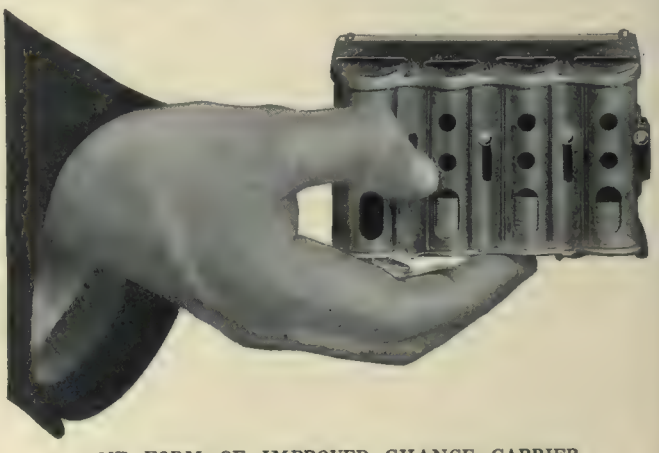
DOUBLE-THROW MAGNET SWITCHES

is normally closed to a preferred source of energy; the auxiliary system is thrown in upon the failure of the preferred source and the normal connection re-established upon the return of full potential to the line. If both circuits are dead, the switch automatically closes to the one first available.

This switch will handle 600-volt railway circuits successfully, and transfers the lighting load from the regular to the auxiliary source of potential so rapidly that the momentary outage in the lighting system is not noticeable. The switch is made by the Palmer Electric & Manufacturing Company, Boston, Mass.

Improved Change Carrier

A conductor's change carrier improved by the addition of thumb levers which eject coins from each of the four compartments, has just been put on the market by the McGill Ticket Punch Company, Chicago. This device is made of brass throughout, the standard outfit containing four compartments, two for nickels and one each for dimes and quarters. It will also be made with



ONE FORM OF IMPROVED CHANGE CARRIER

compartments for pennies or for Canadian coins. One of these improved change carriers is shown in the accompanying illustration. Its advantage lies in the fact that simply by pressing down one of the thumb levers with which each compartment is fitted, coins are ejected one at a time and as rapidly as desired. The ejectors have been so placed that the hand naturally assumes the proper position for receiving the ejected coins. Also the rapid, easy ejection of coins, one at a time, permits the operation of this change carrier with gloved fingers and the receipt of a coin with each operation.

Auto-Bus for Houston

The J. G. Brill Company has lately built for the White Company the auto-bus shown in the accompanying illustration. The bus body was built at Philadelphia but was mounted on a White T. A. D. 3-ton chassis of 16-ft. 2-in. wheelbase in the Kuhlman works.

The body is 18 ft. 2 in. long and 22 ft. 2 in. over the



SINGLE-DECK AUTO-BUS FOR HOUSTON, TEX.

rear platform. The rear wheels are of 40-in. diameter, making the successive risers 15½ in., 13½ in. and 11 9/16 in. from pavement to platform to bus floor. The front exit is by way of a glass-paneled folding door and folding step. The width over the posts is 7 ft. 6 in. and the height from the floor to the center of the headlining 6 ft. 6 in. The cane seats are of cross-seat type, one two-passenger seat on each side of a 17½-in. aisle. The seating capacity is twenty-six.

News of Electric Railways

COMMISSIONERS REPLY TO CHARGES

Governor Whitman of New York Hears Commissioners for the First District on Charges Against Them

The dénouement that attended the hearing on March 23 before Governor Whitman of New York, at which Chairman McCall, and Commissioners Cram, Wood and Williams of the Public Service Commission of the First District answered the charges against them resulted in the Governor adjourning the hearing for two weeks. All the commissioners save Mr. Williams had been heard. As he concluded his prepared brief, Mr. Williams turned to memoranda and began urging on the Governor the meaning of removal from office and apparently bracketed the Governor with the "cruel piratical politicians." The Governor promptly ordered him to withdraw the insinuations under pain of immediate removal. Mr. Williams apologized, saying that he had been laboring recently under mental and physical strain.

Chairman McCall was the first to face the Governor as the hearing opened at noon. He had prepared a pamphlet answering in full the eight charges preferred against him. He called attention to his own unwillingness to leave the bench for the commission and to the sacrifice which he made to do so. Having shown that he was not with the commission at the time mentioned in the charge with reference to the Lexington Avenue subway, the chairman recited the difficulty of deciding the course of the subway. As for the charges based on the method of the commission in dealing with informal complaints Mr. McCall pointed out that the allegation that he neglected them rested solely on the evidence of the chief clerk, who could not possibly know what the chairman did concerning them in consultation with the secretary and the other commissioners. The chairman then explained how the committee had been misled concerning the way these complaints which were styled "informal" were handled. One trouble had been that the legislative investigating committee never had any conception of the real work of the commission or how difficult it was to attend to all its details. The chairman then called attention to the fact that the committee in raising this point about informal complaints had never mentioned the work of the commission in increasing transfer privileges in Brooklyn and thereby removing perhaps the greatest source of complaints. A commissioner could not attend to petty details and do the more important constructive work necessitated by his office.

Taking up the charge that he had permitted the railroad companies to violate the orders of the commission Mr. McCall first pointed out that since he had been chairman the subway had carried 720,000,000 passengers with less than forty complaints. As he passed on to consider the charge founded on the delay in ordering more cars by the Brooklyn Rapid Transit Company, the chairman said that the committee when it made its charge must have known that cars would be in use on the Fourth Avenue Subway in May. The fourth charge dealt with delay in insisting on the improvement of the Brooklyn service. Mr. McCall said in this connection that the commission was bound by law to grant a hearing.

The chairman next turned to the two charges against him of malfeasance in office. The first was founded on the fact that he had practiced law while he was in the commission. He owned frankly that he had gone into the commission with the belief that he could do so. The entire time that he gave to private practice since he went to the commission has been thirteen days. On not one of these days had he failed to be at his desk. Not a meeting had been held when he had been in town, that he had not first gone over the calendar carefully, and more often he had been kept away by the business of the commission than by his private practice. During his two years in office he had never taken a vacation. As for the use of the commission's automobile the chairman explained that it was necessary for him to go on business of the commission to all parts of the city at all hours of the day. His own car had been used more frequently in the public service than the commission's automobile.

In the course of his general plea the chairman said:

"Governor, I have been a Democrat and I shall be a Democrat as long as my principles will permit me. I found in the commission an organization left by my Republican predecessor and it is there to-day. No one under me has dared to ask a man what his politics are. I would rather cut off my arm than remove a man for his political beliefs. Millions of dollars have been spent by the commission but not a single charge of favoritism has ever been brought against it. Our engineering expenses have been cut down to less than 6 per cent of the capital expended and I defy you to make it less. I care no more for place than a child for a broken toy. I hold office at financial loss. But there is something dearer to me than money. Here I stand before you in this town where I was born and where everybody knows me. Here I say to you, I am tenacious of my honor, and for that I protest against these scandalous charges."

Commissioner Wood confined himself to reading his printed brief. He pointed out particularly that he had been in office only eight months, and in going over the specific charges covered much the same ground as the chairman. He pointed out how much he had done for the Bronx and stated that he had made particular inquiries as to the informal complaints that came to the commission from that borough.

Commissioner Cram asserted that the method of handling informal complaints adopted by the commission was in his judgment one of the best things ever done, while the charge that there had been neglect in keeping the subway up to the proper service was absurd, considering it was the most remarkable service in the world. Then he spoke of his achievements in connection with the rehabilitation of the public utilities in Richmond, in moving for the aboliton of the wooden cars in the subway and in promoting the abolition of grade crossings on Long Island.

CLEVELAND CONSTRUCTION MATTERS

Twenty-five owners of property on Euclid Avenue, between East Twenty-second and East Fortieth Streets, Cleveland, Ohio, filed a petition in common pleas court on March 22, asking for an injunction to prevent the Cleveland Railway from constructing a double track over that section of street, commonly known as "Millionaires' Row." Judge A. J. Pearson denied the order, when Attorney Harry J. Crawford, representing the company, gave his personal pledge that work would not be started on the tracks until a similar suit involving another section of street, pending in Judge Vickery's court, has been decided.

The charter adopted by the city of Cleveland some time ago provides that consents of owners of abutting property are not necessary to construct a line on the street. The plaintiffs in this suit insist that consents are necessary in spite of the charter provisions and also that legal permission from the City Council had not been obtained for the construction of the line. Director of Law Stockwell asserted that a temporary injunction was not necessary, as the Council resolution permitting the construction of tracks will not become effective until April 10.

Recently the Brookside Sausage Company brought suit to prevent the company from laying tracks for a loop on Archwood Avenue, S. W., near the entrance of Brookside Park. The allegations are similar to those made in the Euclid Avenue petition. The case will be heard soon and on the decision in this action will depend the result of the later attempt to keep street cars from operating over the heretofore prohibited section of Euclid Avenue.

At a public meeting on March 22 the proposed new franchise for Lakewood was discussed by citizens. Objections were made to the provision for a straight 5-cent fare between Cleveland and Lakewood and several leading men argued that the old rate of eleven tickets for 50 cents between the city and Lakewood and within Lakewood would

be better than the proposal made, by which the fare within Lakewood will be 3 cents. Mayor Tyler threatened to veto any grant made by Council along the lines suggested. Another meeting will be held and in the meantime the Council committee will confer with the company officials and Peter Witt, street railway commissioner.

The subject of a new franchise was discussed in the East Cleveland Council on the same evening. The East Cleveland Chamber of Commerce insists that the length of the franchise be submitted to a vote, while Council stands for a twenty-five-year grant. It is contended by some that the proposed grant will bind the city to a 5-cent fare in case it is annexed to Cleveland and many object to an increase over the city rate.

Councilman Woods submitted a resolution to the City Council on March 22, directing an expenditure of $15,000 for the extension of the Payne Avenue line to an intersection with the East 105th Street line. Mr. Witt opposed the measure on the ground that the extension does not justify the expenditure. At present passengers must walk up or down a hill to make transfers from one line to the other, and people in that vicinity are insisting on the extension.

TRAFFIC IN SAN FRANCISCO

How the Exposition Crowds Are Being Handled at San Francisco

In referring to the successful manner in which the crowds were handled on the opening day of the Panama-Pacific International Exposition an official of the Oakland, Antioch & Eastern Railway said that "the transportation world ought to feel pretty good over what has been accomplished." Since the attendance at the grounds on that day was 246,738, the opinion prevails that with the improvements in the service which both the Municipal Railways and the United Railroads have under way, there will be no delays or inconvenience in handling the traffic even on the busiest days during the exposition. The total number of admissions to the grounds in the first fourteen days was 1,036,349, or an average of 74,025 per day.

The Board of Supervisors of San Francisco, recognizing the able manner in which the railways were operated, adopted the following resolution:

"Whereas, On Feb. 20, the opening day of the Panama-Pacific International Exposition, the Municipal Railways of San Francisco transported 265,000 persons without accident or discomfort, and conveyed them to their destinations without delay; therefore, be it

"Resolved, That the Mayor and the Board of Supervisors hereby extend congratulations and commendation to the superintendent and employees of the Municipal Railways for the splendid service given the public on the said opening day of the exposition, and that there is hereby expressed public appreciation of the courteous and expeditious transportation of the people of this city and visitors who had occasion to use the Municipal Railway service."

A. M. Mortensen, traffic manager for the exposition, expressed the opinion that the facilities for bringing visitors to the exposition grounds were already equal to any requirements likely to be imposed, and recalled that at the Chicago exposition the opening day crowd, though much smaller than at San Francisco, caused great congestion and delay. He pointed out that the location of the exposition grounds at San Francisco was so convenient to the residential portion of the city that many of the opening day visitors would have walked if any inconvenience had attended their using the cars. Although many thousands joined in the parade on Feb. 20, it is estimated that a total of 220,000 people rode directly to the exposition gates. This traffic, it is estimated, was divided as follows:

Municipal Street Railways	80,000
United Railroads (Polk and Fillmore)	50,000
Key Route Ferry (direct)	35,000
California cable road	25,000
"Jitneys" and buses	25,000
Sausalito Ferry (direct)	5,000
Total	220,000

The United Railroads has at present capacity for transporting 28,000 passengers an hour to the exposition gates. Three lines from different parts of the city whose capacity totals 20,000 an hour when operating on forty-five-second headway terminate in a loop at the Van Ness entrance. The Fillmore Street lines can bring 12,000 an hour to the terminus at the top of the hill, whence the seven blocks to the Fillmore entrance are covered by an extension operated as a funicular line for two blocks. This extension has a capacity of 6000 an hour at the present time, but will shortly be improved by putting on closed pay-as-you-enter cars so as to be operated in two-car trains over the funicular part of the line, and the capacity will then become 8000 an hour. These trains are to be operated on less than a two-minute headway over a maximum grade of 25.5 per cent.

The "jitney" buses on the opening day inaugurated a 10-cent fare from the ferries to the exposition grounds, and about 1000 automobiles, including the larger buses, were in operation. The Key Route Ferry maintained a twenty-minute service from its Oakland pier direct to the exposition ferry slip and, in addition to much local traffic from Oakland, carried all the passengers brought in on the excursion trains of the Oakland, Antioch & Eastern Railway, which terminate on the Key Route mole. Altogether about 172,000 passengers were brought over from transbay points, and this number was handled so easily that J. D. Brennan, superintendent at the Oakland pier, where the heaviest traffic centered, said that he knew from this experience that the companies could carry 500,000 people or more into San Francisco in the course of a day.

The total receipts of the Municipal Railways on Feb. 20 were $13,421.20, which represented the cash taken in on 150 of the large new cars and twenty-seven of the small open cars used on the Union Street line. Besides these, eighteen of the large cars were held in reserve. Only one minor accident was reported on the Municipal Railway system, although ninety new crews of platform men had to be broken in during the twenty days preceding the opening date. The receipts on this system on the three days following Feb. 20 were $6,825.75, $8,046.40 and $5,707.70 respectively, and it is now estimated that the probable gross receipts on the system during the exposition will be $3,000,000.

Branches of the Municipal Railways reach all five of the main exposition entrances, and cars are looped on double tracks past three of these. That is, cars arrive at an entrance from opposite directions on each track of the double loop, and by serving one entrance with both pairs of looped tracks the maximum number of cars direct to or from the city pass each main entrance. With this arrangement the minimum effective headway is so satisfactory that it has not been thought necessary to install turnstiles except at the Laguna Street entrance. At this point the only access to the cars is through the exposition exits, so that turnstile collection involved no special inclosure.

WORKMEN'S COMPENSATION AMENDMENT

The Senate of the State of New York on March 19 passed the amendment to the workmen's compensation bill providing for permissive direct settlement between employee and employer. The Senate also passed unanimously the bill appropriating $445,000 for current expenses of the commission. Both bills are now before Governor Whitman for his signature. The amended bill provides that the employer and the employee may enter into a tentative agreement on settlement. Where they do not choose to enter into such a direct settlement, the matter devolves upon the commission. The bill also does away with the actual payment of awards by the commission and provides that payments may be made direct by the employer to the employee. Just before adjournment on March 19 a resolution was passed by the Senate calling for an investigation of the charges that corrupt and sinister influences forced the passage of the amendment providing for direct settlement.

The ways and means committee of the Assembly, which has in its custody the concurrent resolution calling for an investigation which was passed in the Senate, met on March 24, but took no action on that measure, and it is presumed that the resolution will be permitted to die in committee.

THE CINCINNATI INVENTORY

On March 17 the city solicitor of Cincinnati sent a communication to the Cincinnati Traction Company in which he insisted on the right to an immediate examination of the company's books. The company had informed Mr. Schoenle that its books were constantly in use and suggested that the report of the Public Service Commission would contain all the information that he would need. The street railway committee of the City Council now has under consideration the request of Mr. Schoenle for authority to bring proceedings against the company to compel it to allow him to make an examination of its books at once.

On March 22 W. Kesley Schoepf, president of the Cincinnati Traction Company, wrote to City Solicitor Schoenle about the company's policy with regard to his inspection of its books. Mr. Schoepf said in short that the company had nothing to conceal. Its books were frequently examined by city, state and federal authorities. The annual audit was being made when Mr. Schoenle's request was made and at the same time the Public Utilities Commission was engaged at the request of Council on an inventory of the property. He understood that Mr. Schoenle was willing to join with the company in requesting the early completion of the work of the commission. In view of this and the fact that the books were no longer in demand for the audit and by the commission the books were now at Mr. Schoenle's disposal. On the same day Walter M. Draper, vice-president of the company, denied before the street railway committee of the City Council that he had refused Mr. Schoenle permission to examine the books. Mr. Schoenle said that since Mr. Schoepf had consented to allow him access to the books there would be no need of further proceedings. Council had already denied him permission to bring proceedings of any kind to secure the books at this time.

LEGISLATION IN PENNSYLVANIA

The House has passed the bill empowering cities of the second class to tax railroad switches, etc., and has also passed the bill authorizing the merger of street railways in Pennsylvania with street railways outside of the State. Since March 11 bills have been introduced in the Senate to authorize cities to regulate and license certain motor vehicles, etc., and seven measures have been introduced affecting workmen's compensation. Among the bills introduced in the House since March 11 are the following: authorizing cities of the second class to locate, construct, etc., subways or galleries and to require public service companies to use the same under certain conditions; giving certain jurisdiction to the Public Service Commission in the matter of furnishing quotations of stock exchange; making it compulsory on the part of street railways to do an express and freight business; authorizing street railways to lease or operate motor omnibuses, etc.

HYDRO-RADIAL RAILWAYS

At a meeting of representatives of Windsor, Walkerville and Sandwich, held on March 19 in Windsor, Ont., it was decided to memorialize the provincial government in favor of a system of hydro-radial railways. A deputation will be sent from the City Council of Windsor to Toronto on March 26 to meet representatives of the government, when an effort will be made to have engineers from the Hydro-Electric Power Commission detailed to report upon the proposed plan for municipal railway lines to connect the three municipalities.

The second annual meeting of the Niagara District Hydro-Radial Union, comprising the Counties of Welland, Lincoln and Haldimand, was held at Welland on March 19. T. J. Hannigan, Guelph, Ont., secretary of the Provincial Hydro-Radial Association, announced that arrangements had been made with Premier Hearst to receive a deputation from the municipalities of Ontario on March 26, when the government will be asked to adopt the policy of subsidies to hydro-radial railways at the rate of $3,200 a mile. The annual report of the Niagara District Association showed that of the forty-five municipalities in the three counties thirty-five had asked for surveys and that a number of these had been completed by the engineers.

ELECTRIFICATION IN IOWA

The Charles City (Ia.) Western Railway, which operates between Charles City and Marble Rock, Ia., a distance of 18½ miles, announces that it has contracted for the electrification of its line now operated by steam locomotives and gasoline motor cars. In addition to the electrification of the existing line, a 7½-mile extension will be constructed. The overhead construction will be of the mast-arm direct-suspension type and energy will be supplied at 1200 volts d.c. from a central station in Charles City.

Rolling stock for this electrification has been purchased from the McGuire-Cummings Manufacturing Company, Chicago, Ill., and includes two single-truck, all-steel city cars, one all-steel interurban car and one 35-ton electric locomotive. The three cars are to be equipped with General Electric apparatus, the single-truck cars with two GE 270, 50-hp motors each, and the interurban car with four motors of the same type. The electric locomotive, which will be used largely for handling freight between Charles City and Marble Rock, where the line connects with the Rock Island Railroad, will be equipped with four GE 205, 80-hp motors and type M control. According to the present plan of E. R. Ernsberger, general manager, the existing line, which includes 18½ miles of track along with a 2½-mile extension, will be completed and in service by July 1, 1915.

TOLEDO FRANCHISE PROSPECTS

Henry L. Doherty, chairman of the board of directors of the Toledo Railways & Light Company, was in Toledo on March 18. Mr. Doherty said he had nothing new or different in the way of a franchise to offer or suggest and that he was not ready to renew negotiations just at this time. He expects to return to Toledo soon for a conference with the city officials.

The Thurstin ordinance, providing for an issue of $4,000,000 of bonds, the proceeds to be used for the purchase of the tracks and cars of the local company, was considered by the railway and telegraph committee of the City Council on March 17 and was referred back to the city solicitor for additional details as to how it is to be put into operation. Councilman Dotson said that no bids could be secured on bonds until a valuation had been completed of the property upon which the bonds will be a lien.

Municipal Ownership Inquiry Bill.—Assemblyman A. F. Shartel has introduced into the Legislature of California a concurrent resolution directing the State Highway Commission to investigate all interurban electric railways with a view to their ultimate purchase by the State. Mr. Shartel's resolution provides that the commission shall report back to the Governor the result of the proposed inquiry by Jan. 1, 1916.

New Haven Indictment Pleas.—Judge Hunt has postponed in the Federal District Court until March 29 the entering of pleas to the second or superseding indictment returned against twenty-one of the directors of the New York, New Haven & Hartford Railroad. This was done because the government had interposed demurrers to the special pleas made by two of the indicted directors. By March 29 it is expected that argument on these demurrers will have been heard.

Federal Trade Committee.—The board of directors of the Chamber of Commerce of the United States in Washington, an organization representing the federated chambers of commerce of the different cities in this country, has appointed a committee on federal trade to co-operate with the new Federal Trade Commission. It is composed of nine members, one of whom is Guy E. Tripp, chairman of the board, Westinghouse Electric & Manufacturing Company.

Municipal Ownership Bill Defeated.—The Massachusetts House has rejected a bill to provide that the people may vote in any year on the question of public ownership of the electric railways in that State. Mr. Robinson, Boston, characterized the bill as a half-baked proposition. He pointed out that it would absolutely commit the State to the policy of public ownership with a single affirmative vote at a single election, and that this might happen without any public discussion.

Des Moines Franchise Negotiations.—Negotiations between the Des Moines (Ia.) City Railway and the City Council for a new franchise for the company are being continued through the medium of a committee representing the commercial organizations of the city and a new franchise is being drawn up for approval by the city and company. The grant then will be submitted to a vote of the people, probably early in June. Members of the mediation committee included newspaper editors and others of prominence. Emil G. Schmidt, president of the company, is present at the meetings of the committee.

Subway Car Order Accepted.—The Interborough Rapid Transit Company has notified the Public Service Commission for the First District of New York that it will accept the order of the commission, adopted on Jan. 12, 1915, requiring the removal of the 478 composite cars from operation in the subway and the substitution of all-steel cars therefor. The work of removal is to begin May 1 and to be completed by Dec. 1, 1915. These composite cars are a part of the original equipment of the subway. They have steel underframes and wooden sides, sheathed with copper. With the removal of the composite cars, all cars in the subway will be of all-steel construction.

Toronto Report Suit.—John Mackay & Company, Toronto, Ont., have entered action at Osgoode Hall against the city of Toronto, Ont., to recover $42,546.50, alleged to be due for services rendered and for disbursement made in connection therewith. It is alleged that Mr. Mackay was retained by Mayor Hocken to make a report. When his retainer was questioned Mr. Hocken is said to have announced that he would pay the bill himself. This he failed to do. The report for which payment is sought was rendered in connection with the negotiations of the city for the purchase of the property of the Toronto Railway, Toronto Electric Light Company and Toronto & York Radial Railway.

Pittsburgh Subway Bill Objections.—The committee on subway legislation of the Chamber of Commerce of Pittsburgh, Pa., has made a report disapproving the Senate subway bill, already passed by the Pennsylvania Legislature. The chief objections found in the Senate bill by the Chamber committee were that it does not specifically permit the building of a subway confined wholly to the congested area of the city; that it puts no limit on the lease the city may grant to the subway corporation and under its terms a lease might be perpetual and exclusive, and that it gives to the city the right of charging a sum not in excess of 2 cents per passenger for the use of the proposed subway in addition to the charge made by the operating or leasing company.

Subway Construction Contracts in New York.—March 19 was the second anniversary of the signing of the dual system rapid transit contracts. In the two years which have elapsed the Public Service Commission for the First District of New York has awarded thirty-eight construction contracts, which, with those previously awarded, make sixty-four of the eighty-four sections of the city-owned lines already under contract. The commission hopes to let contracts for the remaining twenty sections within the next six months. The total of all city contracts now outstanding is about $142,000,000. The greater part of the work to be done and paid for by the Interborough Rapid Transit Company and the New York Municipal Railway Corporation in the third-tracking and extension of existing elevated lines is also under way.

Separate Chicago Commission.—The Illinois Legislature through its public utilities committee, has undertaken to learn through public hearings the demand for a separate public utilities commission for Chicago. Mayor Harrison, William Hale Thompson, Republican nominee for Mayor, and Robert M. Sweitzer, Democratic nominee, along with aldermen and members of Chicago commercial organizations interested in what is termed "the home rule of public utilities," have appeared before this committee. Two bills are pending before the public utilities committee of the Legislature, one amending the present utilities law by providing for the establishment of a separate commission to be appointed by the Mayor of Chicago, and the other authorizing the City Council of Chicago to appoint a commission to regulate its public utilities.

Financial and Corporate

PASSENGER CAR ORDERS

Electric Railways Surpass Steam Carriers in Large Orders and in Total Cars Ordered

A comparison of the purchasing activity of steam and electric roads, a subject of timely interest in view of the large order this week by the Interborough Rapid Transit Company for 478 car bodies, shows the number of large passenger car orders and of total passenger cars ordered from year to year to be decidedly greater on electric than on steam railways.

In regard to the number of "star orders," electric railways easily surpass steam railroads. Since 1908, inclusive, the largest electric passenger car orders, graded according to size, have been as follows: (1) The Philadelphia Rapid Transit Company, with 1000 cars ordered in 1912; (2) the Chicago Railways, with 700 cars ordered in 1908; and (3) the Philadelphia Rapid Transit Company again with 500 cars ordered in 1913. The Interborough Rapid Transit Company's recent order ranks next, according to the number of car bodies ordered, although owing to the omission of truck equipment in the order, it might rank somewhat lower in amount of expenditure. The greatest number of passenger cars ordered per year by any steam railroad in the last two years, before which time individual figures are not readily available, was only 342 in 1913 for the Pennsylvania Railroad, including the Pennsylvania Lines West. In general, during 1913 and 1914, there were thirteen electric as compared to eleven steam orders for more than 100 passenger cars.

Electric railways also rank first as regards consistent ordering of passenger cars. During the last eight years orders of electric railways for this type of equipment exceeded those of steam railroads for every separate year except 1909, making a total of 31,811 for electric as compared to only 22,951 for steam lines. In view of the great difference between these two figures, which would be much greater if the large number of mail, baggage and milk cars, classed as passenger cars under the latter figure, were omitted, it seems safe to infer that the electric car industry, despite the shorter average length and the less costly character of car body, offers to the manufacturer a field whose relative importance has not always been fully appreciated.

REPORTS ON BUSINESS OPTIMISM

Composite Opinion of Representative Business Men Is Inclined Toward Optimism

A digest recently compiled by Harris, Winthrop & Company, New York, contains the opinions of many representative business men on the commercial and financial outlook of this country. This digest is worthy of note, for it indicates that the scattered advices as to the rising tide of business confidence and activity are in accordance with the conclusions drawn by many business men from the present trend.

According to the composite opinion of more than 700 representative business men, as shown by letters answering specific questions, the stock of goods on hand is low and will need replenishing, thereby increasing future demand. The accumulation of savings is interpreted to be a reassurance as to the future of the investment market and business credit. The unemployment reported is large, but of late is decreasing. It is generally believed that no appreciable burden will be placed on domestic commerce by the higher freight rates. Economy is general, but is in many cases a matter of choice.

When asked for an expression of opinion on these points, 60 per cent of the respondents stated that present conditions made the outlook encouraging. Moreover, 17 per cent stated that there was no abnormal business depression in sight. Confidence and hope are only mental attitudes, but it is interesting to note this expression of optimism on the part of business men themselves.

ANNUAL REPORTS

Milwaukee Electric Railway & Light Company

The comparative statement of income, profit and loss of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for the fiscal years ended Dec. 31, 1913 and 1914, follows:

	1914	1913
Operating revenues	$6,005,495	$6,016,916
Operating expenses:		
Current ordinary operating expenses	$3,095,606	$3,167,365
Depreciation (reserve credit)	698,516	633,359
Contingencies (reserve credit)	1,601	15,042
Taxes (reserve credit)	436,701	390,669
Total	$4,232,424	$4,206,435
Net operating revenues	$1,773,071	$1,810,481
Non-operating revenues	65,807	45,178
Gross income	$1,838,878	$1,855,659
Interest charges	823,375	733,322
Net income	$1,015,503	$1,122,337
Dividends on preferred stock	270,000	270,000
Dividends on common stock	763,375	788,000
Surplus	*$17,872	$64,337

*Deficit.

The comparative statement of income, profit and loss of the railway department for these two fiscal years is as follows:

	1914	1913
Operating revenues:		
Passenger revenues	$4,075,213	$4,184,135
Other revenues	35,505	37,175
Total	$4,110,718	$4,221,310
Operating expenses:		
Way and structures	$135,697	$156,162
Equipment	232,647	295,717
Traffic-power-transportation	1,514,176	1,472,919
General	153,849	111,764
Undistributed	328,427	385,718
Depreciation (reserve credit)	514,488	457,532
Contingencies (reserve credit)	1,097	10,553
Taxes (reserve credit)	299,342	273,935
Total	$3,179,723	$3,164,299
Net operating revenues	$930,995	$1,057,011
Non-operating revenues	14,633	11,926
Gross income	$945,628	$1,068,937
Interest charges	559,895	498,659
Net income	$385,733	$570,278

The total operating revenues of the company for 1914 showed a decrease of $11,421 as compared with the figures for the previous year. This decrease was caused by a reduction in the operating revenues of the railway department of $110,593, in large part offset by an increase of $99,172 in the light and power department. It is stated that the street railway in Milwaukee, in common with those in other cities, is suffering from an absence of growth of revenues and an increase of expenses over which the owners have no control, and the continuation of present conditions in respect to railway net earnings will necessarily affect the ability to expand. During the first seven months of the year the revenues of the railway department decreased 0.7 per cent on account of the then prevailing business depression. The decrease since that time was exaggerated by the disturbances resulting from the European war, making the decrease for the year 2.6 per cent.

The total net income of the company decreased 9.5 per cent, resulting from a decrease in gross income of $16,782 and an increase in interest charges of $90,052. While the gross income of the light and power department increased $106,527, the gross income of the railway department decreased $123,310. This decrease was caused in part by the smaller revenues before referred to and in part by the higher operating expenses brought about by increased car service to comply with prescribed commission standards.

Before arriving at net operating revenues, there were deducted for maintenance and depreciation of physical property amounts equivalent to the following percentages of the operating revenues: railway department, 22.25 per cent; light and power department, 16.25 per cent, and steam heating department, 6.63 per cent. The balances remaining after providing for maintenance in ordinary operating expenses were carried to the credit of the depreciation reserves. The property accounts increased $391,309 during the year, the largest items covering extensions to the overhead and underground electric distribution systems. The amount of construction work was kept at a minimum during the year, the capital expenditures being smaller than those for any year since 1898. A total of 9.4473 miles of track was reconstructed.

The amount of fire insurance protection carried has gradually increased from $2,200,000 for 1911 to $3,633,970 for 1915, while the annual premiums paid have been reduced from $22,000 to $13,082, equivalent to rates of $1 and 36 cents per $100 of valuation. During 1914 loans made to members of the newly formed employees' mutual savings, building and loan association totaled $56,950. At the end of the year the employees' mutual benefit association had 2690 members, $40,926 cash and investments on hand and 526 outstanding life insurance policies, covering $276,500 of insurance. The reserve created against coupons issued with city commutation tickets amounts to $183,549.

Miscellaneous comparative statistical data of the railway department of the company for 1913 and 1914 follow:

	1914	1913
Miles of track owned	165.02	164.87
Miles of track leased	27.51	27.51
Miles of track operated	177.72	177.14
Receipts per mile of track operated	$23,130.30	$23,830.36
Revenue passengers carried	97,874,919	100,073,659
Transfer passengers carried	38,814,573	36,963,958
Receipts per revenue passenger	$0.0416	$0.0418
Revenue car hours operated	1,712,079	1,685,014
Receipts per revenue car hour	$2.40	$2.51
Revenue car miles operated	14,688,176	14,596,686
Receipts per revenue car mile	$0.2799	$0.2892
Number of passenger cars owned	537	537
Maximum number of cars operated	471	462

Chicago City Railway

The gross earnings, expenses and distribution of residue receipts of the Chicago (Ill.) Surface Lines for the year ended Jan. 31, 1915, were as follows:

Gross earnings	$31,966,048
Expenses:	
Maintenance	$2,464,564
Renewals	2,557,284
Operation of power plants	2,781,907
Operation of cars	8,786,523
General expenses—including board of supervising engineers	1,945,924
Taxes	1,353,073
Total expenses of operation	$19,889,275
Residue receipts	$12,076,773
Divided:	
Chicago Railways, 59 per cent	$7,125,296
South Side lines, 41 per cent	4,951,477

The gross earnings of the Chicago Surface Lines amounted to $31,966,048, and expenses to $19,889,275, or 62.22 per cent of the gross, leaving residue receipts of $12,076,773. These were divisible 59 per cent, or $7,125,-296, to the Chicago Railways, and 41 per cent, or $4,951,477, to the South Side lines, namely: the Chicago City Railway, the Southern Street Railway and the Calumet & South Chicago Railway. The income statement of the Chicago City Railway for the year ended Jan. 31, 1915, follows:

41 per cent of the residue receipts of Chicago Surface Lines	$4,951,477
Deduct:	
Joint account expenses, interest on capital investment of the Chicago City Railway and the Calumet & South Chicago Railway, and net earnings of the Southern Street Railway	3,612,889
Net earnings of Chicago City Railway	$1,338,588
City's proportion, 55 per cent as per ordinance	736,223
Company's proportion, 45 per cent, as per ordinance	$602,365
Add:	
Interest on capital, as certified by Board of Supervising Engineers	2,416,913
Income from operation	$3,019,278
Other income, net	279,548
	$3,298,826
Interest on bonds outstanding	1,529,409
Net income	$1,769,417
Dividends, 9 per cent	1,620,000
Surplus	$149,417

The Chicago City Railway produced a net income after the payment of all operating expenses and bond interest of $1,769,417, from which four quarterly dividends were paid, aggregating a total of 9 per cent upon the $18,000,000 of capital stock of the company. The dividend rate shows a

decrease from 10½ per cent last year, largely owing to the decrease in gross receipts during the last half of the fiscal year. The beginning of the European war, Aug. 1, 1914, was followed by the closing of, or by a material reduction in the operating forces of, a large number of manufacturing plants in the city. This immediately affected the receipts adversely, and during the last six months of the year the gross receipts of the Chicago Surface Lines were $608,085 less than the receipts for the same period in the preceding year.

During the year the company built 7.04 miles of single track. The total mileage of single track now owned is 312.75 miles. During the year the company purchased and put in service 226 double truck passenger cars, and twelve cars are now under construction and being delivered. The company bought real estate and erected thereon substation buildings of 8000-kw capacity each at Forty-fourth Street and Kedzie Avenue and at Eighty-second and Halsted Streets and installed machinery and apparatus to the extent of 12,000 kw.

CONDITION OF PHILADELPHIA COMPANY

Mason B. Starring Issues Statement Showing Financial State of Philadelphia Company and Subsidiaries

Mason B. Starring, president United Railways Investment Company, which controls through stock ownership the Philadelphia Company, Pittsburgh, Pa., has issued the following statement on the affairs of the Philadelphia Company:

"Owing to the controversy between the preferred stockholders of the United Traction Company and the management of the Pittsburgh Railways, as to the desirability of the latter corporation applying earnings of United Traction to improvements and betterments instead of paying them out in preferred dividends, a good deal of discussion of Philadelphia Company and United Railway Investment Company securities has resulted, with some selling by holders who do not understand the situation.

"The thing that interests me most is to keep the security holders from sacrificing their securities because of some fear of the condition of the Philadelphia Company or its subsidiary corporations. The net income of the Philadelphia Company for the year ended March 31, 1915, will be more than $5,600,000, available for payment of interest. The interest on all classes of funded debts amounts to $1,913,639, so that there will be left for the payment of dividends and for improvements to the property about $3,700,000, and probably more.

"All interest and rentals of the companies leased or owned by the Pittsburgh Railways have been earned and will be paid. At the outbreak of the war the companies were in the midst of their usual summer work, and it was considered safer to issue script to the common stock for dividends than to borrow money on short time to make these payments, on account of high rates of interest and uncertainties of the money market. The condition of all the companies was never better than it is now."

In connection with the controversy mentioned by Mr. Starring, it may be noted that the protective committee for the stockholders of the United Traction Company has received word that the board of directors of the Pittsburgh Railways has passed a resolution to give the United Traction Company notice of the cancellation of the operating agreement between the companies. A committee from Pittsburgh was expected to confer with the protective committee on March 25 to suggest some plan for the future operation of the United Traction Company. Previous references to this dispute were made in the Electric Railway Journal of Jan. 9 and 16, and Feb. 13 and 20.

Chicago (Ill.) City Railway.—A quarterly dividend of 2 per cent has been declared on the $18,000,000 capital stock of the Chicago City Railway, payable on March 30 to holders of record of March 26. This dividend compares with payments of 2½ per cent quarterly from March, 1910, to September, 1914 (besides extra payments) and 1½ per cent in December, 1914.

Gary, Hobart & Eastern Traction Company, Hobart, Ind.—A certificate was recently filed at Indianapolis covering the reduction of the common stock of the Gary, Hobart & Eastern Traction Company from $125,000 to $100,000, and the creation of $25,000 of preferred stock.

Holyoke (Mass.) Street Railway.—Lee, Higginson & Company, Boston, are offering at 105 and interest $850,000 of first mortgage 5 per cent gold bonds of the Holyoke Street Railway. These bonds are dated April 1, 1915, and are due on April 1, 1935, but are callable at 107 and interest on and after April 1, 1920. The proceeds will be used to retire $250,000 of 5 per cent debentures due on April 1, 1915, and to pay off floating indebtedness incurred for construction and equipment of the railway. The Massachusetts Public Service Commission has expressed its formal approval of this issue. It has also ordered rescinded 2081 shares of capital stock, part of an issue of 4765 shares authorized by the Massachusetts Railroad Commission on June 24, 1913, and not now to be used.

Kansas City Railway & Light Company, Kansas City, Mo.—The holders of the certificates of deposit representing the first lien refunding 5 per cent gold bonds of the Kansas City Railway & Light Company have been notified that the protective committee under the agreement of April 3, 1913, has extended until April 3, 1915, the period within which to receive new securities or cash, pursuant to a sale or a plan for reorganization, or to obtain the deposited bonds.

Los Angeles (Cal.) Railway.—Vice-President Dunn states that no new application will be made by The Los Angeles Railway to the California Railroad Commission for permission to issue bonds, and that no modification of the application which was denied on March 5 is contemplated at least for this year. The commission recently refused to allow the Los Angeles Railway Corporation and the City Railway of Los Angeles to transfer their property to The Los Angeles Railway, as noted in the Electric Railway Journal of March 13. According to Mr. Dunn, whatever extensions will be made will have to be paid for from the earnings above fixed expenses, and with the "jitney" bus continally cutting into the company's business, these are now or nearly nil.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Holders of more than 75 per cent of the outstanding securities of the Oakland, Antioch & Eastern Railway and affiliated roads recently heard the report of the committee of seven appointed to study the affairs of the road. The committee heartily indorsed the policy of the present management and expressed approval of the existing plan for refinancing the system. Concerning foreclosure it declared its opposition in no uncertain terms. Since both the bonds and the stocks are owned by practically the same persons, the committee thought that a receivership would be of no special benefit, whereas by the bondholders waiving their interest for three years and the stockholders advancing $3, the roads would have a chance to work out their own salvation. The report was unanimously accepted by the stockholders, and the committee of seven was re-elected and made a permanent body, one additional member being named. At the request of counsel for the Oakland, Antioch & Eastern Railway, the California Railroad Commission has rescinded its authorization for the railway to mortgage certain real estate at Sacramento and to issue two notes amounting to $58,000 secured by such mortgage. It was stated that the authorization to issue the notes is not now desired or required by the company. Previous references to these notes were made in the Electric Railway Journal of Jan. 20 and Feb. 6.

Rockford & Interurban Railway & Rockford City Traction Company, Rockford, Ill.—The Illinois Public Utilities Commission has authorized the Rockford & Interurban Railway & Rockford Street Traction Company to issue bonds amounting to $86,000.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The question of the value of Key Route properties was debated before the California Railroad Commission on March 16, when an attempt was made to reconcile the conflicting estimates made by the commission and the company's engineers. The total value placed by the commission's staff varied from the companies own figures by $12,969,382. The testimony of George K. Weeks, presi-

dent, established the fact that the different values were based on different areas as well as on different ratings. He stated that the company's own estimate of the total value of the system to-day was $36,492,710, composed of operative property, $25,040,824, and non-operative property, $11,451,886. It was decided that the engineers for both sides should get together and endeavor to straighten out the appraisals in the light of new data from the company. The Key Route is asking the commission for permission to issue $10,000,000 of additional bonds, but the commission asserts that with such an increase the ratio of bonded indebtedness to actual value will be 130 per cent as compared to 108 per cent at present. The corporation expects to show that the present ratio is 47 per cent.

Springfield Railway & Light Company, Springfield, Mo.—An initial quarterly dividend of 1¾ per cent, payable on April 1, has been declared on the $750,000 of 7 per cent cumulative preferred stock of the Springfield Railway & Light Company.

Third Avenue Railway, New York, N. Y.—At a meeting of the board of directors of the Third Avenue Railway on March 23 F. W. Whitridge, president, issued a statement showing that all the surplus of $518,111 earned in the eight months ended Feb. 28 had been expended for additions and betterments, together with an additional $100,000, bringing the total so expended up to about $624,000. Mr. Whitridge said that if anyone should spell a dividend for the company out of these figures he failed to see it. He presented a statement of the budget for 1915, showing that the actual necessary outlays for improvement of the property would require $1,159,400. The directors appointed a committee of James N. Wallace, Adrian Iselin, Harry Bronner, L. F. Strauss and Emlen Roosevelt to consider the future policy of the company as regards both dividends and the outlays for improvements. Mr. Whitridge stated that he took particular pains to have on the committee Messrs. Strauss and Roosevelt, two members of the committee who recently advocated the payment of dividends. The company has issued a circular to holders of the adjustment mortgage 5 per cent income bonds, outlining the conditions under which they may vote at the meetings of the company and urging them to avail themselves of this privilege.

Tri-State Railway & Electric Company, East Liverpool, Ohio.—Edwin Drake, special master, will offer for sale at the county court house in Cleveland, Ohio, on March 30, between 12 and 1 o'clock, the following property of the Tri-State Railway & Electric Company: The street railway in Steubenville, Ohio, formerly owned by the Steubenville & Wellsburg Traction Company, together with its property and franchise rights; 12,995 shares of the capital stock of the Steubenville, Wellsburg & Weirton Railway; 6995 shares of the capital stock of the Beaver County Light Company; 45 shares of the capital stock of the Midland Electric Light & Power Company; 995 shares of the capital stock of the Wellsburg Electric Light, Heat & Power Company, and 115 shares of the capital stock of the Hancock County Electric Company. The railway in Steubenville, with its rights and franchises, constitutes one parcel and bids will be received separately for it in its entirety. All bidders must deposit $5,000 either in cash or certified check. The stocks named are all included in the second parcel and a deposit of $50,000 must be made. In either case, however, first-mortgage bonds will be accepted in lieu of cash or check, when properly assigned. The appointment of the receivers of this company and their preliminary report were noted in the ELECTRIC RAILWAY JOURNAL of March 22 and June 7, 1913.

Urbana & Champaign Railway, Gas & Electric Company, Urbana, Ill.—The Urbana & Champaign Railway, Gas & Electric Company has received permission from the Illinois Public Utilities Commission to issue $95,000 of 5 per cent bonds.

West End Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has authorized the West End Street Railway to issue 8700 additional shares of common stock, amounting to $435,000 par value. These shares will be offered by R. L. Day & Company on April 1 at public auction to the highest bidder at not less than par. The proceeds are to be used to provide for additions.

DIVIDENDS DECLARED

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Maine, quarterly, 1¾ per cent, preferred.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly 1¼ per cent, second preferred; quarterly, 1 per cent, common.

Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred; 50 cents, common.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred and common.

Porto Rico Railways, Ltd., Toronto, Ont., quarterly, 1¾ per cent, preferred.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred.

Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 1½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Jan.,	'15	$29,054	*$17,782	$11,272	$6,722	$4,550
1 "	"	'14	29,798	*18,563	11,235	6,437	4,798
12 "	"	'15	349,149	*210,338	138,811	77,863	60,948
12 "	"	'14	378,915	*210,756	168,159	73,527	94,632

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1m.,	Jan.,	'15	$194,212	*$120,141	$74,071	$62,568	$11,503
1 "	"	'14	184,509	*119,731	64,778	63,576	1,202
12 "	"	'15	2,523,323	*1,457,429	1,065,894	757,851	308,043
12 "	"	'14	2,366,719	*1,330,999	1,035,720	721,117	314,603

THE EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m.,	Jan.,	'15	$206,162	*$123,679	$82,483	$63,285	$19,198
1 "	"	'14	231,944	*150,275	81,669	48,102	33,567
12 "	"	'15	2,598,045	*1,589,618	1,008,427	717,133	291,294
12 "	"	'14	2,719,696	*1,632,180	1,087,516	588,880	498,636

GRAND RAPIDS (MICH.) RAILWAY

1m.,	Jan.,	'15	$104,728	*$67,014	$37,714	$13,740	$23,974
1 "	"	'14	102,585	*65,142	37,443	13,615	23,828
12 "	"	'15	1,288,710	*831,507	457,203	161,904	295,299
12 "	"	'14	1,299,426	*808,819	490,607	165,512	325,095

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m.,	Jan.,	'15	$49,527	*$38,608	$10,919	$15,578	†$4,659
1 "	"	'14	45,299	*39,359	5,940	15,338	†9,398
12 "	"	'15	681,150	*467,057	214,093	186,658	27,435
12 "	"	'14	675,901	*433,983	241,918	180,436	61,482

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m.,	Jan.,	'15	$395,065	*$336,803	$58,263	$118,232	††$32,764
1 "	"	'14	404,062	*350,635	53,427	109,389	††28,864
7 "	"	'15	3,183,083	*2,375,283	807,799	827,339	‡45,676
7 "	"	'14	3,237,732	*2,372,088	865,644	747,857	‡206,501

WESTCHESTER (N. Y.) STREET RAILROAD

1m.,	Jan.,	'15	$17,394	*$22,025	$4,630	$1,349	††$5,971
1 "	"	'14	17,513	*21,226	3,713	1,164	††4,862
7 "	"	'15	159,199	*160,586	1,387	8,886	††10,191
7 "	"	'14	154,522	*149,692	4,830	7,580	††2,589

*Includes taxes. †Deficit. ‡Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Information Summarized from Fourteen Cities—Accidents Attracting Attention—De Luxe Service Proposed

An unusual amount of information in regard to the "jitney" is available this week, but the information does not lend itself any more readily to being given direction than the "jitney" itself. Concerned with something without organization the material itself is more or less disorganized in that it defied being knit into a connected narrative. While for this reason the account which follows necessarily is choppy, it shows beyond question that the hallelujah chorus with which the "jitney" was ushered in has given way throughout the country to a dirge with a staccato accompaniment from the public at large demanding adequate regulation and proper protection for the safety of patrons and pedestrians. Information is summarized from fourteen cities.

The first "jitney" in San Francisco was placed in operation during December, but the number of machines was very limited up to about Jan. 1. Probably the maximum number in operation at any one time has been in the neighborhood of 700. On March 17 it was estimated that 600 "jitneys" were then running in San Francisco. One-half of all the cars are five-passenger Ford automobiles. The remainder are cars of other makes, ranging from five to seven-passenger touring cars. Up to March 17 no regulations have been passed by the city, but an ordinance is now being considered. Thus far the operations of the "jitneys" in San Francisco have been confined to the streets over which the electric railways are operating and to the short-haul travel.

There have never been any "jitney" buses in operation in Denver. The situation was explained to those in authority along the lines contained in the pamphlet, "The Landlord," published by the Denver City Tramway, and the city commissioners passed an ordinance by a vote of four to one which makes it necessary that a franchise shall be obtained before "jitney" service is established. The pamphlet, "The Landlord," was referred to in the Electric Railway Journal of Feb. 6, and the terms of the regulatory ordinance were published in the issue of Feb. 13.

In Portland, Ore., the first "jitney" was started on Jan. 5. The maximum number of cars in service on March 17 was 350, divided as follows: 307 autos carrying five to seven passengers; four trucks carrying twelve to sixteen passengers; three trucks carrying sixteen to twenty-eight passengers, and thirty-six trucks carrying thirty to thirty-two passengers. Up to March 17 no restrictive legislation had been passed in Portland, but the City Council was at that time considering the matter. The terms of the ordinance at Portland were reviewed in the Electric Railway Journal of March 13, page 531, but the measure has since been revised. The opinion prevails that the number of passengers to be carried in the "jitneys" in Portland will be limited by the ordinance to the seating capacity of the car, but doubt is expressed as to the courage of the City Council to include in the ordinance a suitable provision for indemnity bonds. It seems likely now that the whole "jitney" matter will eventually go before the voters of the city at the coming June election in the form of an initiative or referendum petition.

In Oklahoma City "jitney" service was commenced on Jan. 24 with two cars, one a seven or eight-passenger and the other carrying five passengers. Six or possibly eight cars is the largest number that has been in operation in Oklahoma City at any one time. No "jitneys" are operating there now. Restrictive legislation has been passed by the City Commission, as referred to in previous issues of the Electric Railway Journal. To what extent the legislation has worked to diminish the number of "jitneys" it would be difficult to estimate, but the Oklahoma City ordinance was a drastic one, providing many regulations tending to diminish the running of the "jitneys." After the ordinance went into effect several of the "jitneys" abandoned their regular routes and carried a sign reading, "Auto livery, East Side," "North Side," etc. The plan was to carry passengers to any point within a specified distance for a "jitney." This did not last long, and although the weather has been favorable for automobile operation there were no "jitneys" in Oklahoma City on March 16. The Oklahoma Railway received assurances from hundreds of people of the city that its service and its treatment of them were satisfactory and that they would not patronize the "jitneys" under any circumstances.

The "jitney" made its appearance in St. Louis on Feb. 11. A few independent second-hand cars of small type had, however, been running in desultory fashion for a few days before that time. On March 16 there were 216 cars in operation, the maximum number in use at any one time. Practically all of the cars are of the five and seven-passenger variety. Two buses are employed from time to time. As stated in the Electric Railway Journal of March 20, the Commissioner of Streets and the president of the police board have drawn up a set of tentative rules which the police intend to enforce until an ordinance has been passed by the Municipal Assembly. Up to March 13 seventy-six "jitney" drivers had taken the examination prescribed by the police and only two failed. It is expected, however, that the regulations will tend to curb the reckless driving which had characterized the "jitney" in St. Louis in the past.

The "jitney" in Houston, Tex., dates from Nov. 28. The approximate maximum number of buses in operation at any one time was 750, which was the number in operation on March 16. All of them are of the five and seven-passenger type. Up to March 16 no restrictive legislation had been passed, but the City Council was at that time considering an ordinance which contained a provision for an indemnity bond but none against overcrowding. The indemnity bond is one inuring to the benefit of the injured party, whether passenger or pedestrian, the maximum amount to any one individual being $2,500 and for a single accident $5,000. The ordinance provides that a personal bond for the above amount may be accepted. The "jitney" operators state that they are unable to find any bonding company that will write this bond and they are opposing the passage of the ordinance.

The first "jitney" in Buffalo was placed in operation about three weeks ago. Up to March 13 there had not been more than three cars in operation and none were running at that time. The buses which were used in service in that city were ordinary five and seven-passenger touring cars. The municipal authorities are considering the matter of regulatory legislation.

The invasion of Atlanta by the "jitney" was incited and encouraged actively by the Atlanta *Georgian*, a Hearst newspaper, and on Jan. 28 the first "jitney" was placed in operation in that city. Thirteen cars has been the approximate maximum number of "jitneys" in operation in Atlanta at any one time. Three "jitney" bus concerns have applied for State charters as incorporated businesses. Two of the thirteen cars in operation on March 15 were seven-passenger cars, the remainder being five-passenger cars. No restrictive legislation has been passed in Atlanta, but, as stated in the Electric Railway Journal of March 20, legislation introduced by Councilman Lee is pending before a committee of the City Council. This ordinance would require a bond to the city in the sum of $10,000 for two cars or less under the control of one operator and $20,000 for more than two cars. It contains no provision against overcrowding.

Advertisements by the Georgia Railway & Power Company showing, first, why "jitney" buses must be regulated and then explaining term by term the provision of the ordinance have had a twofold effect: they have precipitated an issue that would have arisen some time later and called public attention to the "jitneys" themselves, and they have made it difficult for promoters to secure stock subscriptions. Furthermore, they have put the real interests behind the innovation, the automobile agents, dealers and branch managers, on the defensive in the public prints. In a five-column display advertisement in the papers of March 11 signed by six well-known automobile dealers and ten obscure names connected seemingly with the automobile trade, there appeared these phrases:

"We claim that the owner of an automobile has a right

to make a living by the use of his car if he wants to and to sell your ride for a nickel or a dollar—just what you and he agree upon. He has a right to barter and trade and ride you for a nickel if he wants to.

"But he should not be made a common carrier.

"If they make him that, he must ride anybody who wants to ride and for whom there is room.

"He can't separate the races.

"Can you see what the trolley company is aiming at?

"Every man is entitled to work and earn his living. The man who owns an automobile and wants to ride passengers for a nickel should not be singled out and crushed. Make him a common carrier and he must serve the whites and the blacks. He is through before he starts."

The first "jitney" in Louisville was placed in operation on Feb. 8. The maximum number in operation has been about forty-five. It was reported on March 15 that eleven machines had been withdrawn, but about as many more had replaced these. The cars used have been six seven-passenger cars, three buses with a seating capacity of eleven each and the balance five-passenger cars. Restrictive legislation is pending before the City Council.

The number of buses in operation in Peoria, Ill., is from five to twenty-five. The service is very irregular and fluctuates with the weather, the maximum number of cars being in operation only during more favorable days and the rush hours. The first bus in Peoria was operated on Feb. 6. The capacity of the automobiles in this service is about evenly divided between five and seven-passenger touring cars, there being a larger percentage of five-passenger Fords than any other make of car. No restrictive legislation had been passed in Peoria up to March 17.

The Des Moines (Ia.) City Railway, in spite of the so-called competition of the "jitney," which appeared in Des Moines early in the year, has found traffic increased to such an extent that additional service is now required on two important lines. About fifty "jitneys" are in operation in Des Moines. Their drivers report average receipts of about $10 a day. The correspondent of this paper in Des Moines says that most of the "jitneys" in use in that city are old cars already headed for the junk pile.

The situation at Toledo is somewhat different from that of most other cities. The Toledo Railways & Light Company operates at a 3-cent fare during the rush hours and the "jitneys" charging a 5-cent fare are necessarily at a disadvantage. The "jitneys" have been operating in Toledo for about two months and on March 20 there were approximately twenty cars in operation. Three or four of these carry eight to twelve passengers, but the rest are but four-passenger machines. Already several have gone out of business. The operators bought second-hand machines and the cost of upkeep soon made serious inroads on their capital. Many of the "jitneys" in Toledo run on crosstown streets where no cars are operated. Legislation has been introduced in the Council to bond drivers in order to protect the people from injury, and the Council is sending to other cities for information as to what the legislative bodies there have done.

Labor organizations and the Building Trades Council in Kansas City are opposing the proposed ordinance for the regulation of "jitney" traffic. The measure is considered by the opponents to be too drastic, especially in its requirement for bonds, license fees, and in demanding a seat for every passenger. The regulation of "jitney" traffic in Kansas City, in so far as the element of competition with the street railway service is concerned, offers the paradoxical feature that the city is in effect a partner of the street railway company and under the new franchise will share even more largely in its earnings. In fact, under the receivership the city has practically an equal voice with the company in the management so far as service and traffic are concerned. Any action detrimental to the street railway would be equally detrimental to the city treasury.

Lieutenant Butler, the traffic expert of the police department of Los Angeles, reports that out of the 1800 licenses issued in Los Angeles prior to Jan. 1, only 600 permits have been renewed since the first of the year. More than 300 operators have retired from the field since Jan. 1 and there are only 700 "jitneys" in operation in the city at this time. A short time ago there were about 1200 "jitneys" operated in the city daily.

The committee on mercantile affairs of the Massachusetts Legislature has reported a bill regulating the "jitney" bus business. The bill is an amended draft of that introduced on petition of the Massachusetts Street Railway Association, and differs from the latter in not requiring "jitney" bus owners or operators to form incorporated companies, and in placing the entire regulation of these interests in the hands of boards of aldermen or selectmen, instead of giving regulative authority to the Public Service Commission. The bus owner or operator is required to file a bond of at least $2,000 for each motor vehicle operated to cover damages in case of injury to any person resulting from the operation of such vehicle, and the widest latitude is conferred upon the municipal authorities in granting permits and establishing rules under which such buses shall be run.

The introduction of "jitney" service in Philadelphia has caused the Board of Trades' committee on municipal affairs to recommend to Councils and the Department of Public Safety that legislation be enacted at once to control the service there.

Another bill aimed at the "jitney," which would enable traction companies to compete with the new transportation concerns, has been introduced into the Pennsylvania Legislature. The proposed measure would enable street railways to enter into direct competition with the bus lines by operating automobiles in conjunction with their cars. The bill reads: "That every street passenger railway company incorporated under the laws of this commonwealth and every motor power or other company lawfully operating a line or lines of street passenger railway, shall have power and authority to own, lease and operate lines of self-propelled omnibuses in connection with the lines or systems of street passenger railways so owned, but only after obtaining consent of the local authorities."

A. L. Kempster, general manager of the Puget Sound Traction, Light & Power Company, Seattle, Wash., is quoted in part as follows in regard to the bus situation in that city:

"I understand that the 'jitney' bus people are arranging to attack the validity of the emergency clause in the law passed by the Legislature over the Governor's veto. This would open the law to the referendum and leave the situation as it has been since the beginning of the 'jitney' bus in Seattle. Should such be the case, my company will be unable to temporize further, and the reductions in service already put into effect will be as nothing compared to those we shall be compelled to make unless some relief is given. The Puget Sound Traction, Light & Power Company has retained scores of employees on its payrolls and has continued service where patronage did not exist, in the hope that the situation would clear without the public being greatly discommoded. We shall endeavor in the future to do all in our power for the convenience of the public, but it stands to reason that we cannot operate as many cars and cover the same territory that we have been covering if our short-haul business is to be taken from us indefinitely. We have borrowed millions of dollars to construct lines in territory that has never yielded a profit, and in so doing have mortgaged the profits of the paying lines. Now we find ourselves confronted with the possibility of indefinite continuance of a situation which has brought about enormous losses and we cannot do other than retrench immediately. I do not know that the efforts of the 'jitney' people will be successful in the present instance, but I do know what our course will be if the effort succeeds."

Second in importance to the question of adequate regulation is unquestionably the matter of accidents. From all parts of the country reports are increasing of the carelessness of the operators of the "jitney" and of the increasing hazard which attends riding in cars in competition with the railways and with each other for business. How the casualty men regard the matter has been referred to previously in this paper. Even in cities where regulatory ordinances have not yet been enacted, temporary measures have been adopted in the interest of safety. Among these cities are St. Louis, Pueblo and Fort Worth, in all of which the local authorities have invoked such powers for safety as attach to the policing authority. In Los Angeles, where the "jitney" idea originated, street accidents have increased 22 per cent since the introduction of the "jitney." In

short, accidents averaged 14.9 per day in October, and 23.3 per day in the last two weeks of November, with "jitneys" involved in 26 per cent of the total. In the first eight days of December there were eight accidents per day traceable entirely to "jitneys." In Akron, Ohio, a city of 69,067 population, where the "jitney" has been in operation only three or four weeks, one man has been killed, two others dangerously hurt, one or two horses killed and a score of vehicles damaged. The hazard of suits at law in connection with the "jitney" was stated strikingly at the recent "jitney" ordinance hearing at Los Angeles. E. B. Drake, an attorney whose practice includes personal injury suits, was quoted as follows:

"I am not against the "jitney" bus. I am in favor of it. The more "jitneys," the more business for me, but there is no use suing some one and getting a judgment unless you can collect. I have here the papers in the case of a client, a lad who was mutilated for life. I was given a judgment against a "jitney" bus driver who admitted in his deposition that his own negligence had caused the injury. He can neither speak nor write English, has not paid for his machine yet and has no property that can be attached. Five thousand dollars is not enough for a bond. If there are ten passengers injured that $5,000 would not buy peanuts all around, let alone the attorney's contingent fee. The bond should be at least $10,000."

A 10-cent auto bus line has applied to the City Council for a franchise to operate between the high-class residential districts north and south of the Chicago business district. Montague Ferry, the commissioner of public service, has presented to the Council a measure providing for the operation of 10-cent auto bus lines in the city of Chicago. The provisions of this measure are that the fare shall not be in excess of 10 cents for one way; that the company shall file with the city a published schedule every three months; that no auto bus shall be filled beyond its seating capacity; that its equipment be kept in safe, clean and sanitary condition; that no baggage or packages be carried in the aisles which would obstruct the movement of passengers, and that each bus carry signs designating its route. The proposed ordinance also contains the following specifications to govern the over-all dimensions and the weight of buses: height, 11 ft.; length, 23 ft.; width, 7 ft., and weight 16,000 lb. It is also proposed that the companies shall protect the city against all claims for damages.

NATIONAL "JITNEY" CONVENTION

Meeting of Automobile Men Scheduled to Be Held in Kansas City in May

The men who organized and developed the "jitney" transportation service in Kansas City are taking the necessary preliminary steps to effect a country-wide organization, and a meeting of "jitney" interests will be held in Kansas City on May 4, 5 and 6. The call for the national convention was sent out from the office of the Kansas City "Jitney" Transportation Company, 1133 Grand Avenue, a small upstairs executive office of the Kansas City "Jitney" Association. Downstairs is the operating department, where assistants plan schedules and the "jitney" drivers report. The call for the nation-wide meeting is on the letterhead of the Kansas City "Jitney" Livery Company, of which W. H. Miller is manager and E. K. Carnes traffic manager.

The Kansas City Jitney Association is composed of all drivers and owners who have cars in the "jitney" service. There are 215 touring cars registered and twenty-five buses registered. The members of the association are not under any specific and binding obligation to anybody, but are amenable to suggestions from the officers and managers and strive to conform to the general ideas of service as promulgated by the management. Every member of the association is supposed to pay $1 a week. The Kansas City "Jitney" Transportation Company is a slightly more concrete body, the members of which sign a contract to observe the schedules to which they are assigned and to obey the rules of the association. The Kansas City "Jitney" Livery Company is composed of owners and drivers who are on special service, particularly available for night calls. The dues in the association for the transportation company are $1 a week, each member keeping all he makes.

So many inquiries have come to the managers of the Kansas City association in regard to the operation of cars, the making of schedules, organization work, etc., that a mass meeting of "jitney" people for general discussion of these subjects seemed advisable. E. K. Carnes, therefore, is sending to about 200 cities letters announcing the meeting in Kansas City on May 4, 5 and 6. The letter follows:

"We believe that you are aware of the fact that Kansas City is the third largest automobile market in the world (New York and Chicago alone leading us). More cars are owned per capita in Kansas City territory than in any other. We are the second largest railroad center, consequently easy of access from all parts of the country, and this city is famed for its fine parks, boulevards and drives, as well as entertainment facilities.

"The success of the 'jitney' interests throughout the country is dependent entirely upon their ability to combat successfully the adverse, unfair and piratical legislation proposed at all points, instigated and financed by special interest monopolies and their allied 'invisible government.' Let us take concerted action on the big problems that are confronting us daily.

"No man can say at this time what the near future will develop, but we feel sure this is a pioneer movement destined to revolutionize the transportation problem and the carrying of people in our cities and suburbs. The people flocking to us by the thousands to avail themselves of the quick, pleasant mode of transportation we are offering is conclusive evidence of the above fact.

"We are receiving so many letters daily from all parts of the country that we are calling, in this city, on May 4, 5 and 6, a national convention of 'jitney' people for an interchange of views bearing upon vital points, such as legislation, insurance, safety in operation, licensing of drivers, style of equipment best adapted to the different classes of service under different conditions, etc., and at the same time lay the foundation for a strong nation-wide organization. We feel that such a move will strengthen us in every way, give the public more confidence in the stability of the service, and bring to our aid the manufacturers throughout the whole country with their valuable suggestions and advice, and in every way advance the general movement in all sections.

"We invite your co-operation at this convention and would be pleased to hear from you at an early date as to the number of delegates you expect to send."

Many of these letters are being sent out on the mere chance that there is a "jitney" association, and others on the assumption that the local automobile agents will find it to their advantage to organize one.

It is said that manufacturers and dealers in Kansas City, who have to do with both passenger and truck cars, excepting only the electric vehicle companies, have been more or less sympathetic with the movement. In fact, the local Motor Car Dealers' Association, of which E. E. Peake is secretary, has given substantial aid to the "jitneys," particularly through the participation of its attorney in the fight of the "jitney" association to secure a favorable regulating ordinance.

In Kansas City the recognized "jitney" association has two stands, where its cars are scheduled. The other associations have stands elsewhere in the business district; and one has recently organized to promote package as well as passenger delivery. The Kansas City association is trying to work out a plan of inter-insurance among "jitney" owners for public liability; and it reports that several stock companies are figuring on rates for "jitney" insurance. The "jitney" associations include small and large passenger cars of all vintages; makeshift buses on truck or passenger car chassis, and large buses substantially built for the "jitney" service. There are varying schedules of charges, most of the morning and evening traffic being by passenger cars and buses between specified points at a fare of 5 cents. The association also includes, however, the drivers who ply between the union station and hotels or downtown points and charge 10 cents a trip per passenger, and the cars in special service for which the schedule of prices is based on $1.50 an hour for a five-passenger car. A garage, built with private capital, is being encouraged by the association, where 100 cars may be stored, preference being given to association members.

FINDING IN LAWRENCE TRANSFER CASE

The Massachusetts Public Service Commission has issued an order refusing to grant the petition of the Lawrence Chamber of Commerce for the general establishment of free transfer privileges in Lawrence to all passengers traveling between Haverhill and Lawrence on the Bay State Street Railway. The petitioners based their claim upon the ground that similar transfers are given to and from any part of Haverhill and contended that this constituted an unjust discrimination against the city of Lawrence.

In dealing with the question the board examined existing rates of transportation in and between other large centers. The distance between the cities of Lawrence and Haverhill is 10 miles, which is approximately the distance between Lawrence and Lowell. The fare between Lawrence and Haverhill is 10 cents, while that between Lawrence and Lowell is 15 cents. A transfer to and from all parts of Lowell and of Lawrence is given with the payment of this 15-cent fare. Persons traveling between Lowell and Nashua, N. H., approximately 15 miles, paying 20 cents, are given free transfers in Nashua but no transfers in Lowell. Passengers between Lawrence and Salem, about 21 miles, pay 25 cents, without transfer at either end. The distance between Lowell and Reading is about 15 miles, and the fare is 15 cents, without transfer at either end.

The commission states that the situation presented by the people of Lawrence is not uncommon, and points out that "the establishment of a 10-cent fare for a distance of 10 miles between two municipalities, with free transfers at both ends, would be an extension of fares that would create rather than remove discrimination." A comparison of fares in and about Lawrence with charges for transportation in other cities and their suburbs shows that the people of Lawrence are generally favored with low cost of transportation, and this is instanced in the fact that in Lawrence transfer limits are generally outside the city boundaries, while in Lowell transfers are confined largely to city limits.

The board further points out that inequalities in fare that exist to-day in different communities are in part the result of the willingness of those who originally promoted street railways to trade in fares and the disposition on the part of some local boards to take advantage of that willingness. That the practice in Haverhill in this respect differed from that in Lawrence appeared in the evidence, but was not controlling in its importance. The board says that "any change in fares which would work a substantial diminution in revenue, under present conditions, can only be approved when it is shown that such change is necessary to remove an unjust discrimination." On account of the fact that the aggregate mileage in interurban travel by the Berkeley Street and Prospect Hill branch lines in Lawrence between Lawrence and Haverhill is less than via the main line alone the board feels that transfer facilities should be inaugurated on these lines only, and so orders, but the company is sustained in its objections to granting free transfers elsewhere in Lawrence in connection with the Haverhill service.

NEW COMPANY PUBLICATION

The Portland Railway, Light & Power Company, Portland, Ore., has begun the publication of a pamphlet which it plans to distribute each week to patrons of all of its city and interurban lines. The first issue was dated March 10, and contained an outline of the scope of the publication. The issue is to be 50,000 copies. The chief endeavor of the company will be to create a better feeling toward the company among its patrons and the public in general by commenting in a good-natured spirit upon the numerous problems involving service in all its phases. Included in the publication each week will be one page or paragraph entirely informative or educational in character, dealing with investments, interest, taxes, operation, and in a general way with what the company has done and is doing in the way of maintaining reliable service. It is planned to discuss frankly some of the problems which through misunderstanding have aroused criticism and prejudice. The publication is 4 in. x 7 in. It will be issued under the supervision of W. P. Strandborg, publicity agent of the company, who was formerly connected with the staff of the Evening *Telegram* of Portland.

GROUP INSURANCE PLAN

Policy Is Being Written to Cover the Employees of Missouri Interurban System

A group insurance policy providing $500 death benefits is being written in the Equitable Life Assurance Society on the 121 employees of the Kansas City, Clay County & St. Joseph Railway, including J. R. Harrigan, general manager, and all other employees, all of whom are now members of the mutual benefit association of the railway. R. J. Lyddane, general agent in Missouri for the Equitable company, explained to the members that because of the character of the policy, including all the members of a group exceeding 100, the exceedingly low rate, which figures about $10 a thousand, was possible.

The mutual benefit association provides not only occasional social meetings for the men, but picnics for their families and many other features which have resulted in holding high the standard of their conduct and living. The association has been receiving dues at the rate of 10 cents a week from each member, the company duplicating the amounts paid in. The members have received weekly indemnities for accident and health incapacitation, and there has been life insurance of $100 for each. The association has accumulated a fund of $1,200 since its organization. Under the group insurance policy the Equitable Company, which does not write accident and health insurance, insures merely for death, the indemnity payable being $500, or $400 more than was provided in the association's plan. The company's part of the fund received, which will continue to be an amount equal to the 10 cents a week contributed by the members, will be paid to the Equitable Company, and the members' dues will be applied by the association to weekly indemnities on accident and health claims.

An assessment of $1 a member was made previously upon the death of any member. This assessment will no longer be required under the arrangement with the Equitable Life Assurance Society. The benefits received by members of the mutual organization of the street railway company employees in case of injury or sickness will continue to be $6 a week, the general fund being sufficient to carry the "risk" for some time even without the weekly payments of 10 cents apiece by each member.

Fare Increase Asked.—The Berkshire Street Railway, Pittsfield, Mass., has filed a petition with the Public Service Commission asking authority to increase fares.

Prizes for Traffic Suggestions.—The Municipal Art Society of New York has announced an offer of prizes of $300, $200 and $100 for the best three plans for engineering changes to facilitate traffic at such congested street intersections as Forty-second Street and Fifth Avenue in New York City.

Suit to Recover Mail Pay.—Attorneys for several Eastern railroads on March 18 filed a brief in the Supreme Court in support of their contention that the government has illegally retained some $35,000,000 due to the railroads for transportation of mails. The brief is in a test case to be argued orally on April 5.

Cup for Ball Players.—H. P. Waugh, of the Interborough Rapid Transit Company, New York, N. Y., announces in the *Interborough Bulletin* for March, 1915, that Harry N. Hempstead, president of the Giants, had presented a silver cup to be competed for yearly by members of the Interborough League, composed of employees of the Interborough Rapid Transit Company recruited from various departments.

Car Capacity Order Extended.—Acting upon the observations made by his inspectors Health Commissioner Goldwater has issued orders to the Brooklyn (N. Y.) Rapid Transit Company to keep the loading of its Flatbush-Seventh Avenue and Third Avenue lines down to the limit that he prescribed for the Graham Avenue cars. That is, not more than half as many standing as seated passengers are to be permitted on the cars.

New Brooklyn Cars in Operation.—Two all-steel subway cars of the type which will be used throughout the dual subway system when completed have been placed in oper-

ation on the Sea Beach line of the Brooklyn (N. Y.) Rapid Transit System between Eighty-sixth Street and New Utrecht Avenue in place of the shuttle service surface cars formerly operated between these two points. The design of these cars was described in the ELECTRIC RAILWAY JOURNAL of June 6, June 13 and Dec. 26, 1914, and the electrical equipment in the issue of March 13, 1915.

Hitching Sleds to One-Man Cars.—The item headed "Hitching Sleds to One-Man Cars," which was published in the ELECTRIC RAILWAY JOURNAL of Feb. 13, page 355, was in error in that Regina, Saskatchewan, instead of Brandon, Manitoba, was referred to as a city in which instructions had been issued to the police force to take vigorous measures to suppress the practice indulged in by youths of the city of tying their sleds to the cars of the municipal railway. The railway act of the province of Saskatchewan does not permit the Regina Municipal Railway to operate one-man cars.

New Fare System Satisfactory.—The Union Traction Company of Indiana, Indianapolis, Ind., has included in the pamphlet report of the company for the year ended Dec. 31, 1914, a review of the new system of fares put into effect on Jan. 1 with the approval of the Indiana Public Utility Commission. The company says that experience indicates that the new system is not objectionable because of the difficulty of making change, and that its fairness commends it to the public. References to the change to the "copper zone" system were contained in the ELECTRIC RAILWAY JOURNAL of Nov. 28, 1914, page 1221, and Dec. 19, 1914, page 1366.

Interchangeable Coupon Tickets.—The Auburn & Syracuse Electric Railway, the Buffalo, Lockport & Rochester Railway, the Empire United Railways and the New York State Railways have changed their rules and regulations governing the sale and use of interchangeable coupon ticket books (price $10 per book) by eliminating from the list of carriers over whose lines such books will be honored for passage the Cortland County Traction Company, the Elmira & Seneca Lake Traction Company and the Fonda, Johnstown & Gloversville Railroad, effective on April 1, 1915. Such ticket books sold prior to April 1, 1915, will be accepted for passage over the lines of carriers eliminated, subject to terms of contract under which sold.

Service Stripes in Manila.—The Manila Electric Railway & Light Company, Manila, P. I., is to issue service stripes and insignia for excellent service to its inspectors, graduate conductors and motormen, of the transportation department, and certificates of excellent service to its employees of other departments. Vice-President and General Manager C. Nesbitt Duffy said recently: "The company decided to issue service stripes, insignia and certificates for excellent service to those employees who are deserving of same, as a mark of special recognition because of the excellent service rendered the company and the public in the performance of their duties as employees. The years of service of the employees range from one to ten years. Many transportation department employees will display the double stripe, indicating five years of service, more than 100 will be entitled to wear the metal diamond shaped insignia denoting 'excellent service,' some having earned five or more."

New Signals for St. Louis Cars.—A new method of signaling the motorman to stop and start the car will soon be put into use on the Grand Avenue line of the United Railways, St. Louis, Mo. Briefly, this system consists of an electric circuit in which the rear door, in closing, makes a contact which lights a miniature colored lamp directly in front of the motorman. When the lamp is lighted the motorman knows that the door is closed, and when the lamp is not lighted he knows that it is open. In operation the conductor closes the door when all passengers have boarded the car. The closing of the door automatically gives the signal to the motorman by lighting the miniature lamp. The motorman then starts the car without further signal. When a trail car is in use the signal is not given until the doors of both cars are closed. For stopping the car the present buzzer for passenger use will be removed to the motorman's cab. The motorman will stop the car at the next stop on passengers' signals without further signal from the conductor. The present bell and bell cord will be retained for emergency use.

Personal Mention

Mr. J. V. Collins has been appointed electrical engineer of the Charles City (Ia.) Western Railway.

Mr. C. L. Proctor, for the last six years general superintendent and purchasing agent for the Athens Railway & Electric Company, Athens, Ga., has resigned to accept a position with the Empire District Electric Company at Joplin, Mo.

Sir Albert Stanley, general manager of the Underground Electric Railways, Ltd., London, England, is to present a paper at the International Engineering Congress, at San Francisco, next September, on the subject of "Traffic in London."

Mr. Eliot Wadsworth, of the firm of Stone & Webster, Boston, Mass., sailed for Europe on March 20 on the American Line S.S. *St. Louis*, to prepare at Berlin for executive duties in connection with Polish relief work under the auspices of the Rockefeller Foundation, New York.

Mr. W. Leon Pepperman, assistant to the president of the Interborough Rapid Transit Company, New York, N. Y., formerly chief of office of administration of the Second Isthmian Canal Commission, is the author of "Who Built the Panama Canal?" published recently. The book deals largely with the work done by Mr. Theodore P. Shonts, president of the Interborough Rapid Transit Company, in formulating the plans for the canal during the time that he was at the head of the Isthmian Canal Commission from the spring of 1905 to February, 1907.

Prof. Albert S. Richey, author of the "Electric Railway Handbook," which has just been published, was graduated from Purdue University in 1894 with a B.M.E. degree and took the E.E. degree at Purdue in 1908. After leaving school in 1894 Professor Richey was electrician, chief electrician, electrical engineer and chief engineer successively, first with the Citizens' Street Railway at Muncie, Ind., and later with the Marion (Ind.) City Railway and the Indiana Union Traction Company and other companies which are now included in the system of the Union Traction Company of Indiana. Professor Richey was in active charge of the electrical work during the building of all these various interurban lines. While connected with these companies he also did considerable engineering work for other interurban electric railways in Indiana and Illinois. In 1905 he was appointed assistant professor of electric railway engineering at Worcester Polytechnic Institute, Worcester, Mass., and was made professor of electric railway engineering in 1907. While he has been connected with the Worcester Polytechnic Institute, Professor Richey has done an increasing amount of consulting engineering work, principally with the electric railways in New England, although to some extent in New York, New Jersey, Pennsylvania and Indiana. He has also been a member of the power distribution committee of the American Electric Railway Engineering Association for several years and is at present chairman of that committee. For the last three years he has been chairman of the committee on electrolysis of the American Electric Railway Engineering Association and is at present also a member of the committee on standards of the American Electric Railway Engineering Association. He was one of the representatives of the American Electric Railway Engineering Association on the national joint committee on overhead and underground line construction and is a representative of the American Electric Railway Association on the national joint committee on electrolysis. He is also a member of the railway committee of the American Institute of Electrical Engineers.



PROF. A. S. RICHEY

Mr. M. H. Bronsdon, chief engineer of power and lines of the Rhode Island Company, Providence, R. I., has been appointed to the newly created office of deputy commissioner of public works of the city of Providence, in which capacity he will succeed Mr. Otis F. Clapp as city engineer. Mr. Bronsdon was chief engineer of the Rhode Island Company from March, 1907, until August, 1912. He then engaged in general engineering work in San Francisco, but returned to the Rhode Island Company as chief engineer in December, 1914. The appointment of Mr. W. N. Cargill to the position of chief engineer of power and lines of the Rhode Island Company to succeed Mr. Bronsdon was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915.

Mr. Clarence E. Learned, the newly-elected president of the New England Street Railway Club, is the fifteenth chief executive of the organization, which now has some 800 members affiliated with all branches of the electric railway and many allied industries. Mr. Learned was born in South Boston, Mass., on March 5, 1858. He was educated in the South Boston and South End grammar schools, and in 1876 entered the employ of the banking house of Richardson, Hill & Company, Boston, where he remained two years. He then accepted the post of bookkeeper with Oscar Foote & Company, Boston, fertilizer and grain dealers. Mr. Learned's father was killed in a railroad accident in 1878, following which the new president took charge of his father's business for about two years, later returning to the organization of William H. Dow & Company, Boston, successors of the Foote concern. Mr. Learned traveled in New England for this house until 1886. After serving for a year as traveling passenger agent of the Boston & Hingham Steamboat Company and for a time engaging in newspaper work on the Boston *Herald* he was asked to join the forces of the West End Street Railway, Boston, by Mr. Henry M. Whitney, in 1888, as chief inspector, later becoming superintendent of the inspection department of the Boston Elevated Railway, the successor to the West End road. Mr. Learned is a Mason, belonging to the Boston Commandery. He is a Shriner, is affiliated with the Elks and is a member of the Boston City Club. He has been second vice-president of the American Electric Railway Transportation & Traffic Association, and has served on the committee on the training of employees of that association and is at present a member of the committee on fares and transportation. He was married at West Somerville, Mass., in 1882, and resides with his wife and one daughter at Wakefield, Mass.



C. E. LEARNED

OBITUARY

Frederick Winslow Taylor, author of "The Principles of Scientific Management" and "Shop Management," and well known as an efficiency engineer, died at Philadelphia, Pa., on March 21. Mr. Taylor was fifty-nine years old. He was graduated from Stevens Institute in 1883 and began his business career with the Midvale Steel Company at Philadelphia in 1878. He was president of the American Society of Mechanical Engineers in 1905 and 1906.

Charles Francis Adams, an original member and for seven years chairman of the Massachusetts Railroad Commission, died at his winter residence in Washington, D. C., on March 20. Mr. Adams was born in Boston in 1835; was a great grandson of President John Adams and a grandson of President John Quincy Adams. He was a son of Charles Francis Adams, minister to Great Britain during the Civil War, and had a distinguished career in military, historical, legal and railroad fields. He served on the Massachusetts commission from 1869 to 1879 and was at one time president of the Union Pacific Railroad. In 1897 he investigated the relations between street railways and municipalities in this country and Europe.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Lordship Company, Bridgeport, Conn.**—Chartered in Connecticut to operate the 3-mile electric line now being constructed by the Wilkenda Land Company on Hollister Avenue between Stratford Avenue and Lordship Manor, in Bridgeport. Contracts for the system, including a concrete carhouse, have been awarded the F. T. Ley Company, Springfield. Power will be bought of the Connecticut Company, but otherwise the lines of one will have no connection with those of the other company. Capital stock, $500,000. Walter B. Lasher, Frederick A. Bartlett and John T. Kenworthy are among those interested.

FRANCHISES

Fresno, Cal.—The Fresno Traction Company has received a franchise from the Council for an extension from the Wishon Avenue line to the Normal School grounds in Fresno.

New Britain, Conn.—The Hartford, New Britain & Meriden Railway has asked the Council for a franchise to extend its lines by a different route to New Britain. [Jan. 2, '15.]

New Britain, Conn.—The New Britain, Kensington & Meriden Railway has asked the Council for an extension of time on its franchise in which to complete the construction of its line between Meriden and New Britain. E. A. Moore, New Britain, president. [May 16, '14.]

Louisville, Ky.—The Louisville Railway Company was the only bidder present at the public sale by the city of the franchise providing for a double-track electric railway extending north from the terminus of the company's Chestnut Street line to Madison and thence west to Shawnee Park, in Louisville. This means construction of approximately 2 miles of double track. Work is to be begun as soon as the weather permits.

Ludlow, Ky.—The Council of Ludlow has granted the South Covington & Cincinnati Street Railway a twenty-year franchise. The company is to pay the city $250 and contribute $10,000 toward the construction of a permanent viaduct across Elm Street, between the railroad and Locust Street. A twelve-minute schedule will be maintained through the day, with a five-minute service during the rush hours, morning and evening.

Boston, Mass.—The Boston & Eastern Electric Railway has asked the Council for an extension of time on its franchises to April 1, 1917, in which to build its proposed line. The project entails a tunnel between Boston and East Boston and routes connecting Lynn, Peabody and other towns and cities east and north of Boston.

East Chester, N. Y.—The Westchester Electric Railway has received a franchise from the Council for the extension of its North Pelham-Mount Vernon line from the North Pelham village line to Union Corners, East Chester. The extension will open up two new sections, Chester Heights and Chester Park, and connect them with the New York, Westchester & Boston Railroad. Before the new line can be placed in operation it will be necessary to reconstruct a bridge over the Hutchinson River, near North Pelham.

Patchogue, N. Y.—The Suffolk Traction Company has received from the Council a three-year renewal of its franchise within the incorporate limits of Patchogue.

Cleveland, Ohio.—The Cleveland Short Line has received a franchise from the Council for several short extension of its tracks in Cleveland.

Findlay, Ohio.—The Toledo, Bowling Green & Southern Traction Company has notified the Council that the company will accept the twenty-year franchise recently granted by the Council.

TRACK AND ROADWAY

Lethbridge (Alta.) Municipal Railway.—The City Council of Lethbridge has been asked to undertake the extension of this municipal railway to Hardieville.

British Columbia Electric Railway, Vancouver, B. C.—Plans are being made by this company to begin work soon on a new line on the south side of Front Street in New Westminster.

***Sacramento, Cal.**—A system of State owned and operated electric railway lines extending along the state highways, now being built under the $18,000,000 bond issue, is urged in a resolution submitted to the Assembly recently by Mr. Shartell of Alturas. This is a separate and distinct movement from the proposed State purchase of the Western Pacific Railway. It is stated that California in building the extensive highway system has a right-of-way with grades suitable for electric lines.

San Francisco (Cal.) Municipal Railway.—Bids are being awarded for the construction of the Beach terminal loop for the Geary Street municipal line in San Francisco.

Connecticut Company, New Britain, Conn.—Surveys are being made to extend the double tracks from the Electric Field to a point near the Trumbull Electric Company's plant in Plainville this summer. This will complete a double track line from New Britain to Plainville. Extensive plans are being made by this company for strengthening all its bridges about New Haven over which heavy electric railway traffic is operated.

Washington Railway & Electric Company, Washington, D. C.—This company has been authorized by the Public Utilities Commission to issue $353,000 of general improvement 6 per cent debenture bonds to defray the expenses of work largely carried out.

Capital Traction Company, Washington, D. C.—This company has asked the Public Utilities Commission for permission to extend its lines along Seventeenth Street and I Street northwest in Washington. The route would begin at Seventeenth and U Streets; extend south on Seventeenth to I Street; thence easterly on I Street to Thirteenth Street; southerly on Thirteenth Street to H Street, and easterly on H Street to Seventh Street, connecting with the company's present lines at that point.

Miami (Fla.) Traction Company.—Plans are being made by this company to build a line on the Southside in Miami. B. B. Tatum, Miami, president. [Feb. 6, '15.]

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Work has been begun laying track and overhead work is well under way by this company on its 18-mile line between Lewiston, Idaho, and Clarkston, Wash. H. C. Hartung, Lewiston, general manager. [Feb. 27, '15.]

Danville Street Railway & Light Company, Danville, Ill.—Residents of Oaklawn, a Danville addition, have petitioned this company to construct a line from Junction Avenue, east along Wellington Street to Illinois Street to intersect the line on that street, a distance of several blocks.

Illinois Northern Utilities Company, Dixon, Ill.—Contracts have been awarded by this company to build 1½ miles of new track in Dixon.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Preliminary details for the construction of the electric line to connect Benton, West Frankfort, Herrin, Marion and Johnston City have been completed and work will be begun within a few weeks on the roadbed. W. H. Schott, president. [March 6, '15.]

Chicago & Joliet Electric Railway, Joliet, Ill.—An extension of the Hickory Street line in Joliet from its present terminal at Smith Street to Theilers Park is being planned by this company.

Murphysboro & Southern Railway, Murphysboro, Ill.—During the next few weeks this company will award contracts to build 7 miles of new track in Murphysboro. The company will also build one 17-ft. steel span bridge and one 60-ft. steel viaduct.

St. Joseph Valley Railway, Elkhart, Ind.—Application will be filed at once by this company with the Secretary of State of Ohio for a supplementary charter to build an interurban railway to connect Angola, Ind., and Toledo, Ohio.

Arkansas Valley Interurban Railway, Wichita, Kan.—At a special adjourned meeting March 4 the City Commissioners passed an ordinance providing for an election to vote on a $30,000 issue of terminal aid bonds for this company, which is ready to begin construction on the extension from Halstead as soon as the bonds are voted. The election was set for March 29. Charles D. Bell is local manager for the company at Hutchinson.

Duluth (Minn.) Street Railway.—Construction this year of a double track extension from West Duluth to New Duluth has been ordered by the Council in Duluth. This company is to have its new line in operation by Dec. 1.

Minneapolis & Central Minnesota Railway, Minneapolis, Minn.—About 20 miles of grading has been completed by this company on its proposed electric line to connect Minneapolis, St. Cloud and Little Falls. Capital stock, authorized, $1,000,000. E. G. Potter, 433 Andrews Building, Minneapolis, president. [Feb. 20, '15.]

Metropolitan Street Railway, Kansas City, Mo.—Arrangements are being made by this company to begin immediately the reconstruction of its tracks on Walnut Street from Seventh Street to Twelfth Street in Kansas City, preliminary to the paving of that street, which carries the heaviest street railway traffic of any part of the Metropolitan's lines.

Moberly, Huntsville & Randolph Springs Railway, Moberly, Mo.—Work has been resumed by this company on its line in Randolph. This 12-mile line will connect Randolph Springs, Moberly and Huntsville. Charles H. Dameron, Huntsville, president. [Jan. 23, '15.]

City Light & Traction Company, Sedalia, Mo.—During the next few weeks this company expects to rebuild its track and repave some of its lines in Sedalia.

Missouri Interurban Railroad, Sedalia, Mo.—This company reports that no definite plans have yet been decided upon when construction will be begun on its proposed 40-mile line to connect Sedalia, Prairie Home, Smithton, Otterville and Bunceton. B. H. Colby, Security Building, St. Louis, chief engineer. [Jan. 24, '14.]

Trenton & Mercer County Traction Corporation, Trenton, N. J.—Plans are being made by this company for an extension of its North Olden Avenue division from East State Street to North Clinton Avenue in Trenton.

Manhattan Bridge Three-Cent Line, Brooklyn, N. Y.—An issue of $140,332 corporate stock has been authorized by the Board of Estimate to provide terminal facilities for this company on both sides of the bridge structure. These terminal facilities are estimated to cost $240,000. Under the revised plans the terminal of the company will be ultimately located on an embankment, which is to be erected at the corner of the Bowery and Bayard Street, on the Manhattan side of the bridge structure.

Brooklyn, N. Y.—The Public Service Commission, First District, will shortly advertise for bids for the construction of Section No. 2 of Route No. 12, the Eastern Parkway subway in Brooklyn, to be operated by the Interborough Rapid Transit Company, bids to be opened April 20 next. The Eastern Parkway subway is an extension of the existing subway, and runs from its terminus at Atlantic and Flatbush avenues, Brooklyn, out Flatbush Avenue to Eastern Parkway and out Eastern Parkway to Buffalo Avenue as a four-track line, with a three-track elevated extension from that point out East Ninety-eighth Street and Livonia Avenue to New Lots Avenue, and a two-track subway branch down Nostrand Avenue to Flatbush Avenue. It is already under construction in Flatbush Avenue west of Prospect Park Plaza. Section No. 2 covers that portion of the line extending from Prospect Park Plaza under Eastern Parkway to a point east of Nostrand Avenue. The subway will be built on the double-deck plan, devised for the purpose of saving the trees in Eastern Parkway.

International Railway, Buffalo, N. Y.—An extension of its line down South Park Avenue to the south city line in Buffalo is being planned by this company.

New York, N. Y.—The Public Service Commission, First District, has approved the form of contract submitted by the Interborough Rapid Transit Company for the construction of a portion of the West Farms subway connection.

This section, which is authorized by the dual system contracts, leaves the Third Avenue elevated line at about 134 ft. north of the center line of East 143d Street, and runs through Willis and Bergen Avenues to a point near 149th Street, and thence to a connection with the Lenox Avenue branch of the existing subway. It is authorized under the certificate covering the rights for elevated railroad extensions, and as such is to be built by the company at its own expense. The only condition attached to the approval of the contract is that the company must get bids from at least six responsible bidders and submit the bids to the commission for its approval.

Black River Traction Company, Watertown, N. Y.—During the next few months this company plans to spend $15,000 on improvements of its lines in Watertown.

Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.—Preliminary arrangements are being made by this company to build its electric line between Ossipee and Durham via Altamaha, Glencoe, Carolina, Hopedale, Burlington, Graham, River Falls and Chapel Hill. John M. Cook is among those interested. [March 13, '15.]

Cleveland, Alliance & Mahoning Valley Railroad, Alliance, Ohio.—This company announces that it will place in operation its line between Newton Falls and Levittsburgh on April 1. Work will continue on the section of the line from Ravenna to Cleveland during the coming summer. The line to connect Alliance and Akron is well under way and will be in operation as far as Marlboro within the next few months.

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—Work will soon be begun by this company on its line to connect Chardon, Hampton, Rock Creek and Jefferson, a distance of about 30 miles. F. A. Pease, Cleveland, engineer. [Aug. 15, '14.]

Ohio Valley Traction Company, Portsmouth, Ohio.—Contracts will be awarded at once by this company for the extension from Sciotoville to Ironton.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio.—During the next few weeks this company expects to build about 4500 ft. of double track with 100-lb. rails.

Brantford, Ont.—The Council has approved of the plan for the extension of the Brantford Municipal Railway in the form of a loop for Eagle Place, and gave permission to the Street Railway Commissioners to proceed with the work.

Toronto, Ont.—Early in April the Works Department will begin the laying of a permanent electric railway track on Bloor Street, to replace the temporary civic line.

***Sutherlin, Ore.**—Plans are being considered to build an electric railway from Sutherlin to Umpqua via Garden Valley and Coles Valley, a distance of 14 miles.

***Johnstown, Pa.**—It was announced recently that negotiations for the construction of an electric railway from Johnstown to Rockwood eventually to connect with the Pennsylvania & Maryland Street Railway line by an extension of the latter railway from Garrett to Rockwood, have been completed. J. A. Vandergrift & Company, Inc., New York City, will finance the railway project. The Penn Electric Service Company will furnish the power, while the Johnstown Traction Company's right-of-way into Johnstown will be used from Kelso Mines, about 5 miles from the central part of Johnstown. This proposed line will extend through Shamrock, Murdock, Roberts, Edgewood, Somerset, Harrison, Acosta, Jenner, Ferrelton, Boswell, Jerome and Holsopple; then northward to Davidsville and down Tire Hill to the Kelso Coal Company's operations, where a junction will be effected with the Windber line of the Johnstown Traction Company.

Pittsburgh (Pa.) Railways.—Residents of South Hills have asked this company to complete the double-tracking of the Beechview line out to Mount Lebanon as soon as possible.

Pottstown & Phoenixville Railway, Pottsville, Pa.—The extension to Linfield has been completed and work has been begun on the Spring City side of the Schuylkill River. The bridges and about half of the grading are completed for the line from Spring City. The plans for approval of the bridge across the Schuylkill River are now being considered by the War Department at Washington; work will be begun at once on the concrete piers. The line from Phoenixville will be shortened to Spring City by a cut-off on the line outside of Phoenixville extending direct up along the canal to Spring City, which will be used by the high-speed cars only. A schedule from Pottstown to Philadelphia of one hour and a half will be established.

Reading Transit & Light Company, Reading, Pa.—A new electric railway route to Philadelphia will develop as the result of plans of this company to build a connecting link between Boyertown and Pottstown, announcement of which was recently made. This also will mean a direct electric route to Philadelphia from Lancaster by way of Reading.

***Iloilo, P. I.**—The first suburban electric railway to be built in the Philippines outside the city of Manila, and the first to be built with Filipino capital in the Philippines, is to extend between the city of Iloilo and the adjoining towns of Jaro, Arevalo and Oton. An application for a franchise has been included in a bill introduced in the Assembly recently by Delegate Mapa of Iloilo.

Beaumont, Liberty & Houston Traction Company, Houston, Tex.—Preliminary arrangements are being made by this company to begin work on this proposed line between Houston and Richmond. Edward Kennedy, president. [Nov. 21, '14.]

Marshall (Tex.) Traction Company.—During the next few weeks this company expects to rebuild in Marshall ½ mile of roadbed with concrete base.

Petersburg & Appomattox Railway, Petersburg, Va.—Preliminary surveys have been begun by this company on its line between Petersburg and City Point. T. M. Wortham, Petersburg, president. [March 20, '15.]

Virginia Railway & Power Company, Richmond, Va.—An extension of the Grove Avenue railway from the intersection of Canal Street up to High Street near the baseball park in Petersburg is being considered by this company. The company is asked to extend its Forest Hill line for a mile from the present terminus in Richmond.

SHOPS AND BUILDINGS

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—This company has awarded a contract to build a new carhouse in Lewiston.

Murphysboro & Southern Railway, Murphysboro, Ill.—During the next few weeks this company will award contracts to build two new carhouses in Murphysboro.

Boston (Mass.) Elevated Railway.—Plans are being made by this company to build a new passenger station in Malden.

Boston & Worcester Street Railway, Boston, Mass.—During the next few weeks this company expects to award contracts to build a new carhouse to replace the one destroyed by fire in Westboro. The location for the new structure has not been decided upon.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company is completing its new fireproof office and carhouse in Niagara Falls.

Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio.—Citizens of Shelby have asked this company to consider the question of locating its new power house and carhouses in Shelby.

POWER HOUSES AND SUBSTATIONS

Ohio Valley Traction Company, Portsmouth, Ohio.—Plans are being made by this company to build three new substations. They will be located at Franklin Furnace and Hanging Rock. The structures will be 40 ft. x 20 ft. and one story in height.

Gallipolis & Northern Traction Company, Gallipolis, Ohio.—We are advised that after May 1, 1915, this company expects to close its power house in East Gallipolis and buy its current from the Gallipolis Electric & Power Company, in Gallipolis, Ohio.

Toronto (Ont.) Suburban Railway.—This company has taken out a permit at Galt, Ont., for the erection of a new transformer station.

Manufactures and Supplies

ROLLING STOCK

Murphysboro & Southern Railway, Murphysboro, Ill., expects to purchase three standard interurban cars.

Scioto Valley Traction Company, Columbus, Ohio, has purchased one 60-ft. steel center-entrance passenger car from the Cincinnati Car Company.

Ohio Valley Traction Company, Portsmouth, Ohio, is reported as having ordered four 65-ft. combination passenger and baggage interurban cars from the G. C. Kuhlman Car Company.

Iowa Railway & Light Company, Cedar Rapids, Ia., has purchased one 50-ton electric locomotive, the body and trucks to be furnished by the St. Louis Car Company, and the electrical equipment by the General Electric Company. The latter consists of four GE-207, 600-1200-volt motors with Type M control.

Hagerstown & Frederick Railway, Frederick, Md., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 27 as expecting to purchase new car equipment, has ordered from The J. G. Brill Company two 37-ft. Brill patented semi-convertible combination passenger and baggage cars and one 19-ft. near-side vestibule car.

Marshall (Tex.) Traction Company has orded three 21-ft. 6-in. all-steel one-man car bodies from the Cincinnati Car Company through its Eastern sales agent, W. R. Kerschner, Inc., New York. The order was placed through H. E. Molé, consulting engineer American Public Securities Company, 50 Liberty Street, New York.

Empire United Railway, Syracuse, N. Y., is reported as rebuilding a car in its own shops, with the view of securing unusual lightness and thereby effecting economies in power consumption. The results obtained from this sample car will probably serve as a basis for the purchase of new light equipment.

Charles City (Ia.) Western Railway has ordered two single-truck city cars, one double-truck interurban car, and one 35-ton electric locomotive from the McGuire-Cummings Manufacturing Company. The three cars will be of all-steel construction and equipped with GE-217, 50-hp motors with Type K control. The electric locomotive will be equipped with four GE-205, 80-hp motors with Type M control.

Interborough Rapid Transit Company, New York, N. Y., has ordered from the Pullman Company 478 all-steel car bodies to replace the composite bodies now being used in the subway. The steel bodies will be placed upon the trucks now used under the composite cars and the present motors will also be used on the new cars. It is the intention of the company to use the composite car bodies on the elevated lines, as they are replaced by the all-steel bodies in the subway. The car bodies will be duplicates of the steel bodies now operating in the subway. The contract calls for delivery to commence within 100 days, at the rate of twelve bodies per day.

Metropolitan Street Railway, Kansas City, Mo., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20 as having ordered fifty single-end, double-truck closed prepayment motor cars from the American Car Company, has specified the following details for this equipment:

Date of delivery	June 1, 1915
Seating capacity	48
Estimated weight of car body, fully equipped	18,600 lb.
Bolster centers, length	19 ft. 7 in.
Length of body	29 ft. 10 in.
Length over bumpers	44 ft. 10 in.
Width over sills	8 ft. 6 in.
Width over all	8 ft. 8 in.
Height, rail to sills	31 in.
Height, sill to trolley base	11 ft. 6½ in.
Body	wood and steel
Interior trim	cherry
Headlining	Agasote
Roof	arch
Underframe	steel
Air brakes	GE. CP-27, with emergency feature.
Axles	Jones & Laughlin
Bumpers	8-in. channel
Conduits and junction boxes	National Formed Metal Products Co.
Control	K-35
Couplers	Met. St. Ry., modified
Curtain fixtures	Forsyth short tip, ring fixture, Rex rollers.
Curtain material	Pantasote
Destination signs	Hunter
Fenders	Eclipse
Gears and pinions	GE, grade K
Gongs	Amer. Car Co.
Hand brakes	Peacock & Amer. Car Co.
Heaters	Consol., RU thermostat
Headlights	Golden Glow
Journal boxes	Brill 3¾ in. x 7 in.
Motors	4 GE-247-D, inside hung
Paint	Chicago Varnish Co.
Registers	International
Sanders	Met. St. Ry., foot pedal
Sash fixtures	Forsyth beadless brass (lower only).
Seats	Brill non-reversible, offset rail across top of back
Seating material	rattan
Step treads	Universal anti-slip
Trolley catchers	Earll
Trolley base	U. S. No. B
Tracks	Brill 77-E
Varnish	Murphy
Ventilators	Ry. Utility Co., honeycomb
Special devices	Consol. door lamp signal, Aluminum stanchions, Forsyth pressed-steel carlins

TRADE NOTES

Railroad Track Work Company, Philadelphia, Pa., which recently shipped one of its reciprocating grinders to Nashville, Tenn., is demonstrating a machine in Louisville for the Louisville Railway. It has been in use on several of the streets for the last week, the local company having much to contend with in the way of corrugated rails.

Burke Electric Company, Erie, Pa., has recently made arrangements whereby George Hills, an expert on electric welding, has become head of its arc welding department. Mr. Hills will be located at the main office and works at Erie, Pa.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a sheet describing its portable hydraulic wheel press and sand dryer.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 43900, superseding No. 4925B, which describes its combined unit series mercury arc rectifier, for converting alternating into direct current for the operation of series luminous arc lamps. The rectifier set consists of the constant current transformer, d.c. reactor, tube tank, exciting transformer, static discharger and pilot lamp mounted on a common base.

New Jersey Meter Company, Plainfield, N. J., has issued a bulletin describing its "Tool-om-eter" or compressed-air meter. It has a capacity of 10 cu. ft. to 100 cu. ft. of free air per minute. This meter shows direct on a scale, in cubic feet of free air per minute, the flow of air in a pipe or hose. It measures the air consumption of any machine or application of compressed air and the actual net production of air by any compressor or pump within its capacity. These meters have only one moving element which floats on air and consequently does not cause friction and is non-wearing.

NEW PUBLICATION

The Law of Carriers of Goods. By Ralph Merriam. La Salle Extension University, Chicago, Ill. 1914. 180 pages. Cloth, $1.25.

The object of this book is to furnish the reader with a knowledge of the elementary principles of the law of carriers of goods, and to train him for the analysis and application of court decisions on this subject. It is neither exhaustive nor super-technical in character, but is so written as to equip the ordinary man for the investigation of particular traffic questions that may arise in his business. The first subject discussed is the general principles of common carriage, and attention is then turned in succession to the following topics: Duty of carriers to accord undiscriminating service at reasonable rates, delivery to carriers, exceptions to the rule of extraordinary liability, limitations of liability, liability of initial and connecting carriers, delivery by carriers, bills of lading, actions against carriers, carrier's compensation and carrier's lien. Each chapter is followed by test questions, which serve aptly to bring out the main points of the preceding discussion in a comprehensive manner.

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of automatic signaling for Electric Railways



Style "B" Semaphore Signals at Passing Siding, Ohio Electric Railway.

This system is especially designed for the operation of interurban railroads. It combines the maximum of safety and efficiency with the least amount of apparatus.

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"I can only add that experience since the 1910 report has only fixed more firmly in my mind the necessity for liberal use of rail grinders.

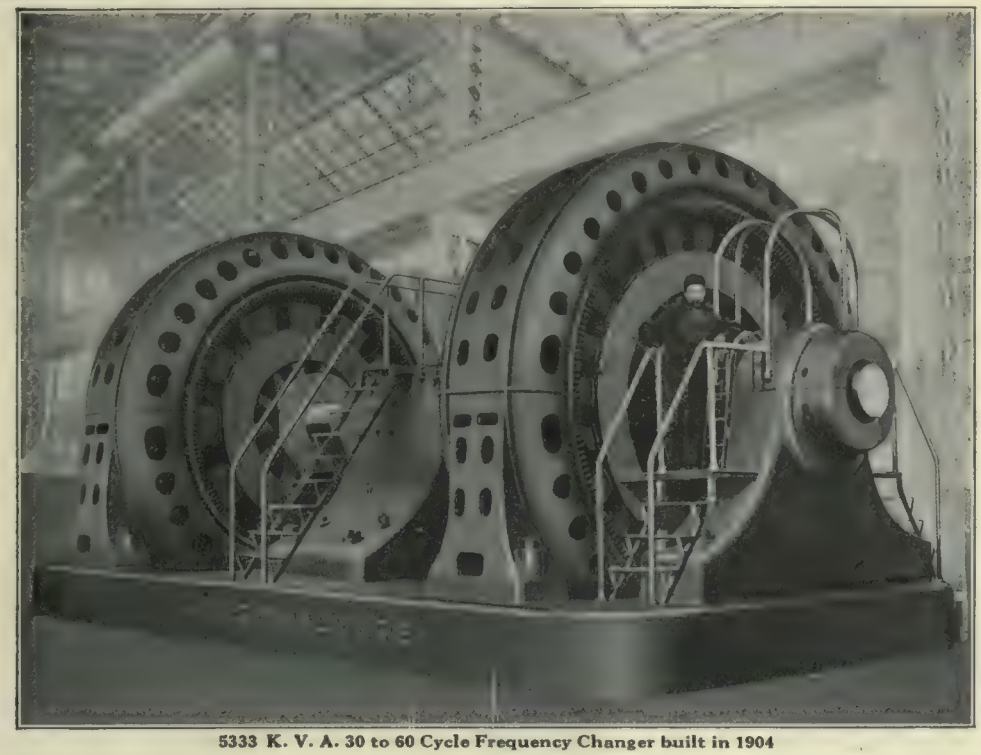
Of course, if any one who is interested in this subject will write me direct, I would be pleased to give him any information that we have."

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We will forward your inquiries to him.

Railway Track-work Co., Heed Bldg., Philadelphia

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5333 K. V. A. 30 to 60 Cycle Frequency Changer built in 1904

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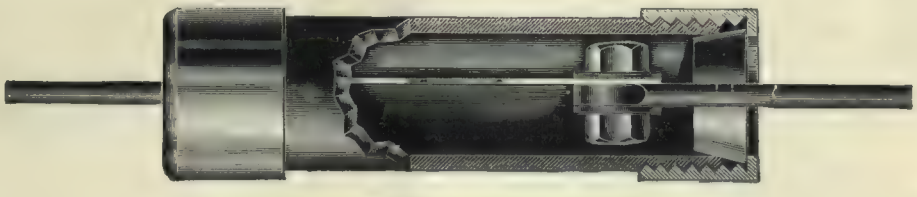
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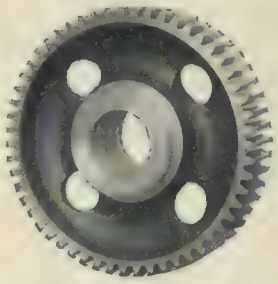
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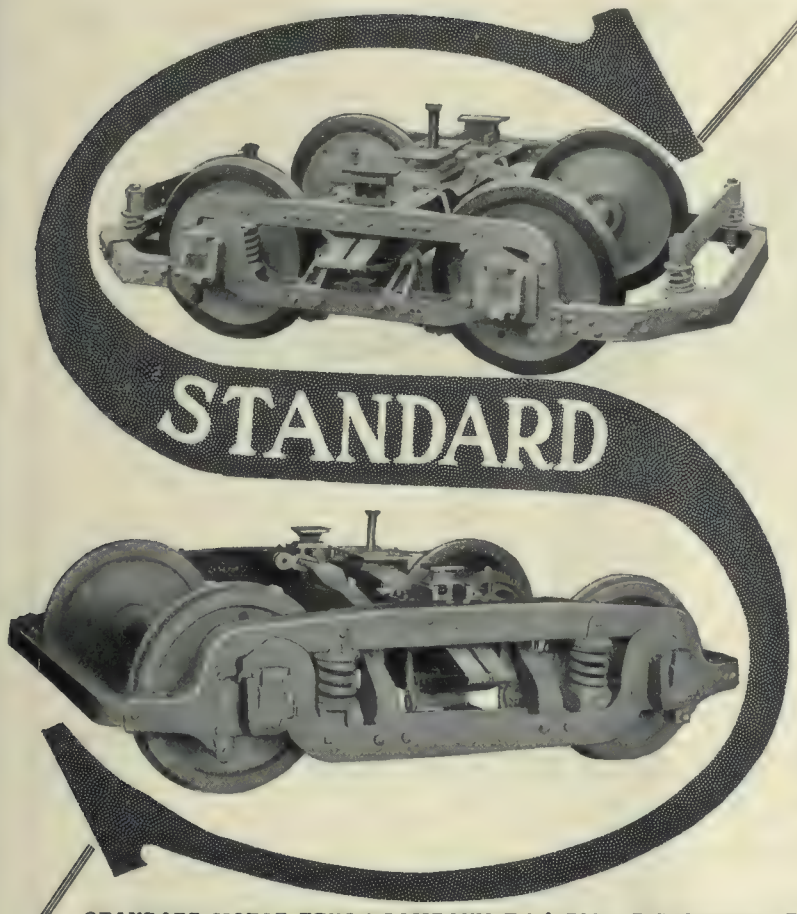
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For Safe, Long-time Service

Opposite is shown our Standard 0-50 "SHORT WHEEL BASE" DOUBLE TRUCK.

Frames solid forged without welds, i.e., made from one continuous bar of open-hearth steel. Carrying capacity 50,000 pounds at king pins, 34" Forged Steel wheels, 3¾ x 7" M.C.B. journals. Brake shoes hung on the equalizer bars (thus insuring uniform wearing of brake shoes). All wearing holes steel-thimbled and bolts case-hardened. This truck is used throughout the New England cities, New York, Detroit, Toledo, Oklahoma City, Seattle, Jacksonville, Kansas City, San Francisco, Cincinnati, Indianapolis and many other cities.

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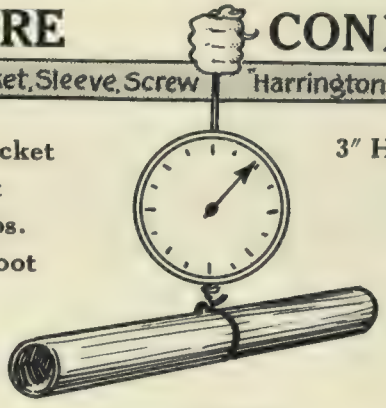
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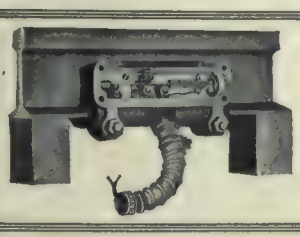


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The cost of installation is very low when it is considered that the Twin Terminal offers all the advantages of double bonding.

We manufacture four forms of Twin Terminal Bonds, made to meet all possible conditions.

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Pyrene protects you. Broken wires and imperfect contacts often start serious fires. And fire in railway power-houses by attacking insulated cables sets up "shorts" resulting in furious arcs. But—arc or fire—

There is Safety in

Pyrene

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It Gets Both

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Built along quality lines to withstand long, severe service.

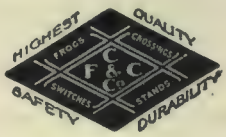


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TRACK SPECIAL WORK



WE MAKE THIS GRADE ONLY

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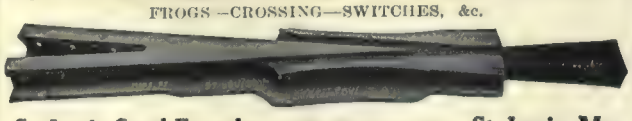
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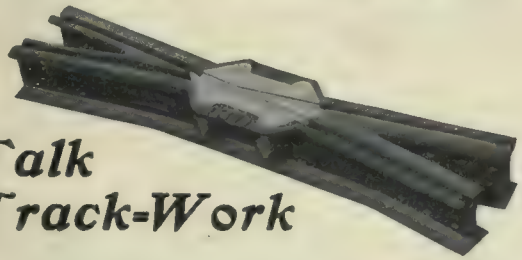
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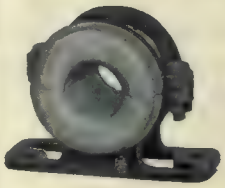
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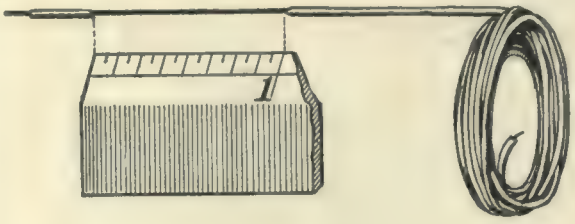
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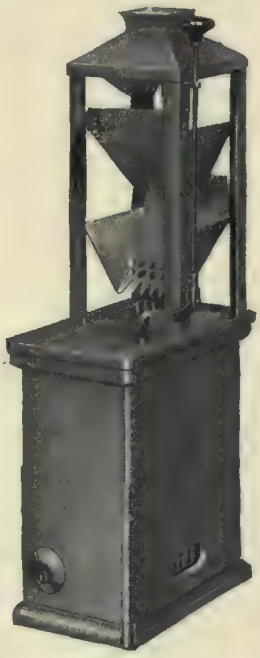
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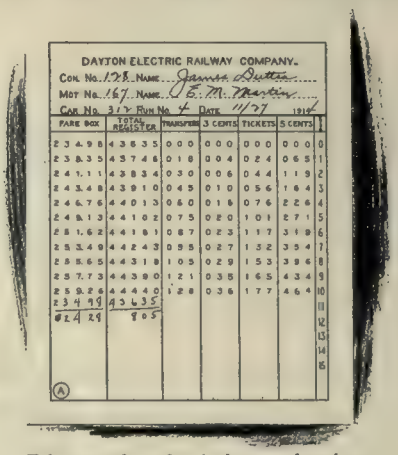
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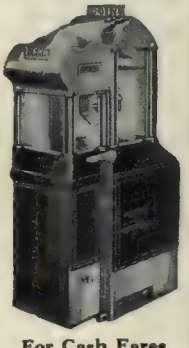
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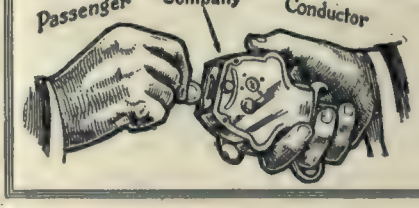
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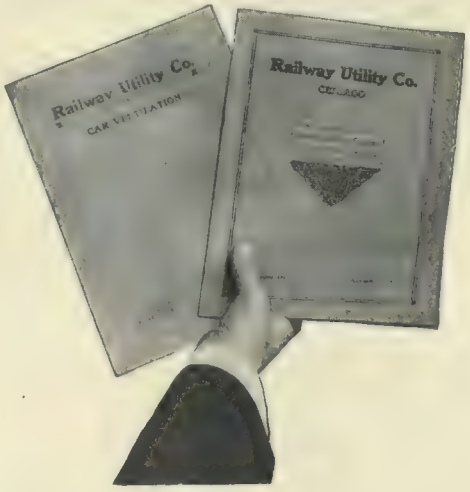
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1—20 H. P. 925 R. P. M. General Electric, D. L. C. Type.	175.00
1—20 H. P. 1040 R. P. M. Westinghouse, Type S	150.00
1—15 H. P. 925 R. P. M. G. E.	125.00
2—10 H. P. 1400 R. P. M. G. E., each	100.00
1—10 H. P. 950 R. P. M. Westinghouse	100.00
3— 5 H. P. 1200 R. P. M., each	50.00
220-volt Direct-Current Motors, starting boxes and pulleys.	45.00
1— 7½ H. P. 1400 R. P. M. Kester	45.00
1— 3 H. P. 1500 R. P. M. General Electric	35.00

We also have a number of smaller 220-volt D. C. motors, vacuum cleaners, meters, fans, ceiling and desk, massaging machines, etc. Write us.

CHARLOTTESVILLE & ALBEMARLE RAILWAY COMPANY, Charlottesville, Va.

POSITIONS WANTED

CAR painter—A competent and thoroughly all around mechanic, who is desirous of making a change wants position. Best of experience, good worker, efficient in handling men, or will work under good foreman, desirous of making change. Can give good recommendation from past and present employers. Box 678, Elec. Ry. Jour.

COMPETENT storekeeper and shop accountant desires change. Over 10 years' experience in above positions with large western interurban line. Box 719, Elec. Ry. Jour.

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

EXPERIENCED man open for engagement as general superintendent or master mechanic; many years' experience all branches; A1 references. Box 700, Elec. Ry. Jour.

MASTER mechanic open for immediate engagement. Long experience, reliable and unquestioned ability. Best references. Would also consider position of superintendent. Box 712, Elec. Ry. Jour.

POSITION wanted by a man who has had 18 years' experience as superintendent and roadmaster and constructing street car lines. Best references. Box 713, Elec. Ry. Jour.

POSITION wanted by construction man on railway equipment. Efficient wireman or pipefitter. Can take charge. Best references. Address Box 718, Elec. Ry. Jour.

POSITIONS WANTED

SUPERINTENDENT equipment or master mechanic open for a position; 20 years' experience; can furnish the best of references. Would consider position of general superintendent of small property. Box 711, Elec. Ry. Jour.

SUPERINTENDENT of equipment or master mechanic desires position. At present in charge of a first class road but desires to change. Have had 18 years' experience on city elevated and high speed interurban. Good organizer and equipment manager, thoroughly up to date on all types of equipment. Best of references. Box 661, Elec. Ry. Jour.

TECHNICAL university graduate. Eight years in railway equipment work, car building and cost estimating. Wants responsible position with railroad executive. Employed now. References. Box 717, Elec. Ry. Jour.

TECHNICAL graduate, age 24, desires position as assistant to railway superintendent or master mechanic. One year experience with large electrical manufacturing concern. At present employed in railway maintenance department. A1 references. Box 720, Elec. Ry. Jour.

WANTED—By a thoroughly competent Italian, position as track foreman; twenty years' experience all kinds of special and track work. Can furnish A1 reference. Box 716, Elec. Ry. Jour.

WANTED—By a thoroughly up-to-date, reliable and competent man, 40 years of age, experienced in all branches of railway operation and maintenance, position as superintendent or superintendent of equipment. Best of references, past and present. Correspondence solicited concerning any good opening. Box 697, Elec. Ry. Jour.

BUSINESS OPPORTUNITIES

Recently Patented

Successful readjusting member for car brakes. In use for the past eight months and proved successful. Want to sell United States patent or will sell company rights to street railway companies. Will market at a big profit. Send for specification. Amel B. Broluska, 466 Fairview Ave., Detroit, Mich.

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STEEL DUMP CARS

STANDARD GAGE

16—4 Yard Rocker Type
Absolutely First-Class

BIG BARGAIN

ZELNICKER
WALTER A. ZELNICKER SUPPLY COMPANY
in St. Louis

HAVE MANY OTHER BARGAINS

FOR SALE

AT BARGAIN PRICES—One 120 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 200 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 300 KW, General Electric, 133 Cycle Single Phase Alternator. Address "H. F. W., Jr.," 309 Colby-Abbot Bldg., Milwaukee, Wis.

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Over 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

Accountants.
Greims Corporation, H. E.

Acetylene Service.
Prest-O-Lite Co., Inc., The.

Advertising, Street Car.
Collier, Inc., Barron G.

Alloys and Bearing Metals. (See Bearings and Bearing Metals.)

Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Busses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co.

Badges and Buttons.
International Register Co.
Western Electric Co.

Bankers and Brokers
Halsey & Co., N. W.

Batteries, Dry.
Johns-Manville Co., H. W.
Protective Signal Mfg. Co.
Western Electric Co.

Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co.

Bearings and Bearing Metals.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Protective Signal Mfg. Co.
Reiter, G. C.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.

Blowers.
General Electric Co.
Westinghouse Elec. & M. Co.

Blow Torches for Soldering and Brazing.
Prest-O-Lite Co., Inc., The.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Graphite.
Dixon Crucible Co., Jos.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co.

Bond Clips.
Electric Railway Imp. Co.

Bond Testers.
American Steel & Wire Co.
Roller-Smith Co.

Bonding Apparatus.
Prest-O-Lite Co., Inc., The.

Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebling's Sons Co., John A.
Western Electric Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Electric Service Supplies Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Adjusters.
Sauvage-Ward Brake Co., Inc.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Brazing. (See Welding.)

Brooms, Track, Steel or Rattan.
Western Electric Co.

Brushes, Carbon.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Bumpers, Car Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Bunting.
Boyle & Co., Inc., John.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Rubber.
Imperial Rubber Co.

Buttons. (See Badges and Buttons.)

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G.
Niles Car & Mfg. Co.
Wason Mfg. Co.

Cars, Prepayment.
Prepayment Car Sales Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Composition or Copper.
Anderson M. Co., A. & J. M.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.

Catchers and Retrievers, Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.
Wasson Eng'g & Supply Co.
Wood Co., C. N.

Ceiling, Car.
Pantasote Co.

Change Carriers.
Etter, Chas. F.

Cheese Cloth.
Boyle & Co., Inc., John.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.

Cleats, Car Wiring.
General Electric Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co.
Johnson Fare Box Co.

Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.

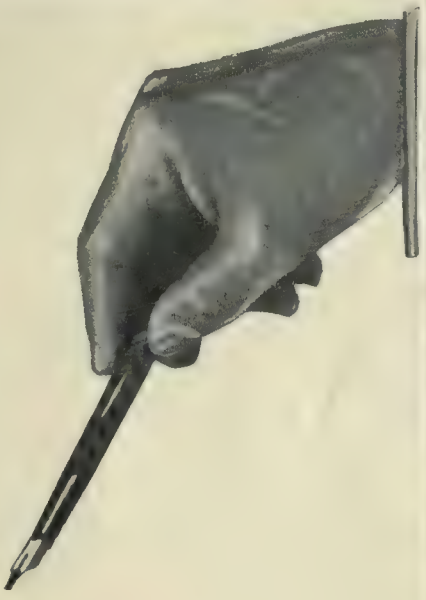
Commutator Truing Devices.
American General Eng'g Co.
General Electric Co.
Western Electric Co.

Commutators or Parts.
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.

Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.

Conduits, Flexible.
Fibre Conduit Co.



Le Carbone

—the always Uniform always Efficient carbon brush.

W. J. Jeandron
173 Fulton St., New York

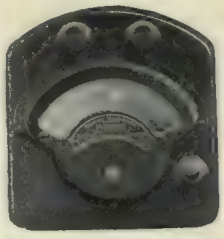
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In Very Small Indicating Instruments for Direct Current

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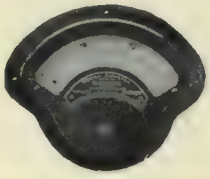
Weston

Miniature Precision Instruments



MODEL 280, Single Range Portable Voltmeter
(One-quarter Size.)

PORTABLE
Volt-Meters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
are supplied in single, double and triple ranges, the Triple Range Volt-Ammeter comprising six instruments in one. This group also includes BATTERY TESTERS.



MODEL 267, Switchboard Ammeter.
(One-quarter Size.)

SWITCHBOARD
Voltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters
This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.
They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate, dead beat and extremely sensitive.
They may be left continuously in circuit at full load and are shielded against external electrical and magnetic influences.
They are substantially constructed and have the longest scale ever provided in instruments of similar size.
The prices are surprisingly low for instruments of such quality.
The several models and ranges offer a selection from over 300 different combinations. They are listed in BULLETIN NO. 8, WHICH WILL BE MAILED UPON REQUEST.

Weston Electrical Instrument Co., Newark, N. J.

New York	St. Louis	Detroit	Richmond	Winnipeg
Chicago	Denver	Cleveland	Toronto	Vancouver
Philadelphia	San Francisco	Buffalo	Montreal	Berlin
Boston		Atlanta		London

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MORGANITE
Brushes

MARK

Prescribed—not merely sold.

The Morgan Crucible Co., Ltd.
120 Liberty St., New York
Factory Brooklyn



Buckeye Emergency Jack No. 239

An extra powerful and handy Jack for extra difficult jobs.

Forged Parts are Special Heat Treated

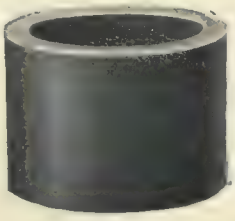
This Jack can be worked from many angles to load, yet full lifting power is available from any position. Write for catalog, details and price.

The Buckeye Mfg. Co.
Alliance, Ohio

7180 1

LONGWEAR BUSHINGS

Hardened Steel Accurate Uniform



Dimensions Exactly as You Specify

E.G.Long Company

50 Church Street New York

READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

Conduits, Underground.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Western Electric Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Allis-Chalmers Mfg. Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Green Eng'g Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
Garton Co., W. R.
Imperial Rubber Co.
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Cotton Duck.
Boyle & Co., Inc., John.

Couplers, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co., The.
Railway Supply & Curtain Co.

Cushions, Field Coil.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.

Cutting Processes.
Prest-O-Lite Co., Inc., The.

Derailing Devices.
U. S. Metal & Mfg. Co.

Despatching Systems.
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.
Western Electric Co.

Detective Service.
Wisch Service, P. Edward.

Door Operating Devices.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Asbestos.
Johns-Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.
Electric Service Supplies Co.
Prepayment Car Sales Co.

Doors, Steel Rolling.
Kinnear Mfg. Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)

Dryers, Sand.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Herrick, Albert B.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Schott Co., W. H.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.

Engines, Gas and Oil.
Allis-Chalmers Mfg. Co.
Westinghouse Machine Co.

Engines, Steam.
Allis-Chalmers Mfg. Co.
Westinghouse Machine Co.

Fare Boxes.
American General Eng'g. Co.
Brill Co., The J. G.
Cleveland Fare Box Co.
Dayton Fare Recorder Co.
International Register Co.
Johnson Fare Box Co.

Fences, Woven Wire and Fence Posts.
American Steel & Wire Co.

Fencing Wire.
American Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cincinnati Car Co.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.
Western Electric Co.

Fibre.
American Vul. Fibre Co.
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.

Fibre Tubing.
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.

Fire-proofing Material.
Johns-Manville Co., H. W.

Fittings, Malleable, Cast Iron & Brass.
National Tube Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns-Manville Co., H. W.
Western Electric Co.

Forgings.
American Bridge Co.
Standard Motor Truck Co.
Standard Steel Works Co.

Furnaces. (See Stokers.)

Fuses and Fuse Boxes.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Johns-Manville Co., H. W.

Gaskets.
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.
Westinghouse Machine Co.

Gates, Car.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.

Gauges, Oil and Water.
Ohio Brass Co.

Gear Blanks.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Gears and Pinions.
American General Eng'g Co.
Amer. Vulcanized Fibre Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Van Dorn & Dutton Co.

Generators, Alt.-Current.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Generators, Dir.-Current.
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Gongs, Rotary Foot.
Reiter, G. C.

Graphite.
Dixon Crucible Co., Jos.
Morgan Crucible Co.

Grates, Chain.
Green Eng. Co.

Greases. (See Lubricants.)

Grinders, Portable, Electric.
Railway Track-work Co.
U. S. Metal & Mfg. Co.
Western Electric Co.

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
American General Eng'g. Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Garton Co., W. R.
More-Jones Brass & Metal Co.
Star Brass Works.
Universal Trolley Wheel Co.
Western Electric Co.

Headlights.
Electric Service Supplies Co.
Esterline Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Headlinings.
Pantasote Co.
U. S. Metal & Mfg. Co.

Heaters, Car, Electric.
Johns-Manville Co., H. W.

Heaters, Car, Hot Air.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.

Hoists and Lifts.
Curtis & Co., Mfg. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Van Dorn & Dutton Co.

Hose Bridges.
Ohio Brass Co.

Hose, Pneumatic and Fire.
Imperial Rubber Co.
Johns-Manville Co., H. W.

Hydraulic Machinery.
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Impregnating Apparatus. (See Vacuum Drying Apparatus.)

Inspection.
Elec'l. Testing Laboratories, Inc.
Hunt & Co., Robert W.

Sterling Insulating Varnishes
Sterling Iron Enamel Paints

There is a Sterling product best for every insulating purpose.



The Sterling Varnish Co.
Pittsburgh, Pa.

U. S. Metal & Mfg. Co.
165 BROADWAY, NEW YORK CITY
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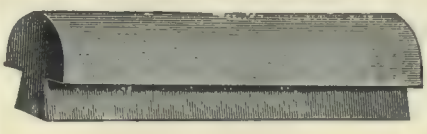
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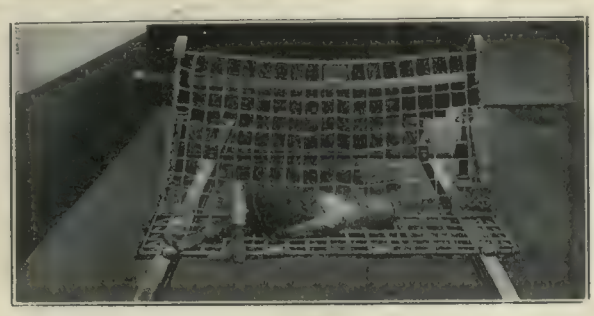
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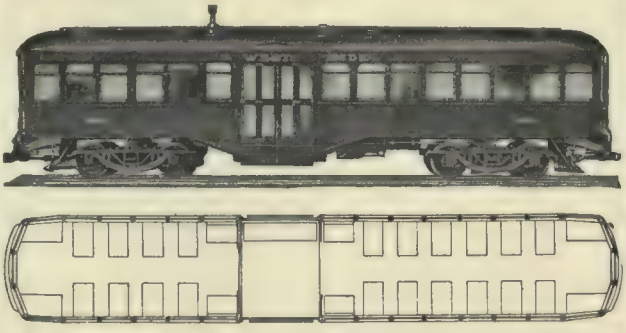
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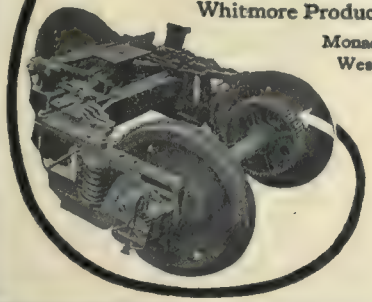
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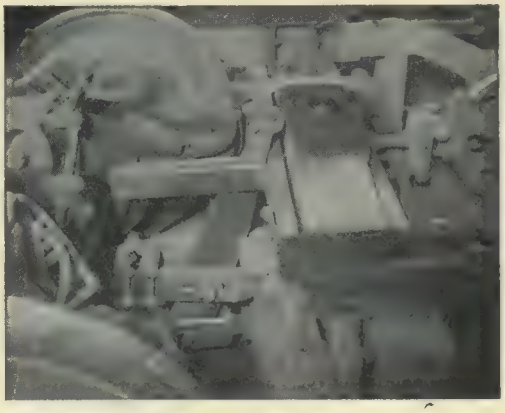
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includes brake-shoe wear—idle equipment due to frequent adjustments and replacing shoes, and accidents brought about by slack brakes.

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ALPHABETICAL INDEX TO ADVERTISEMENTS

NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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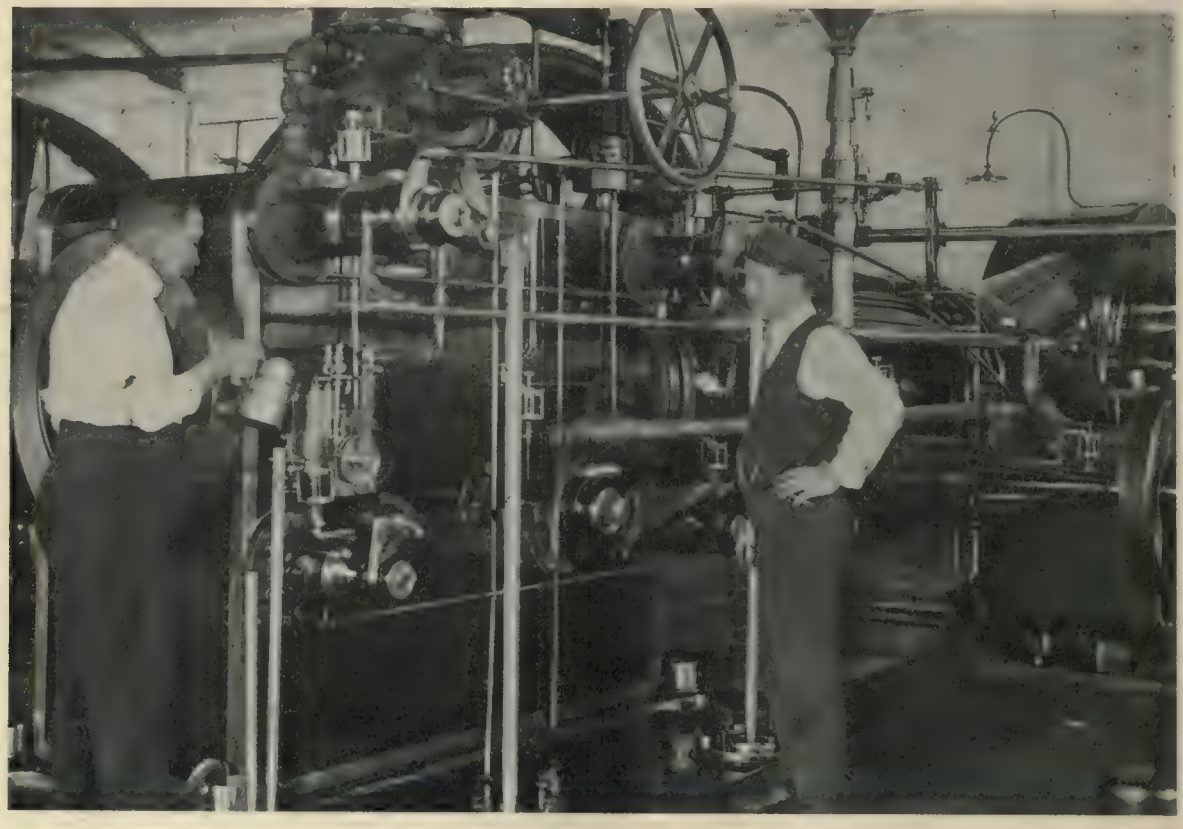
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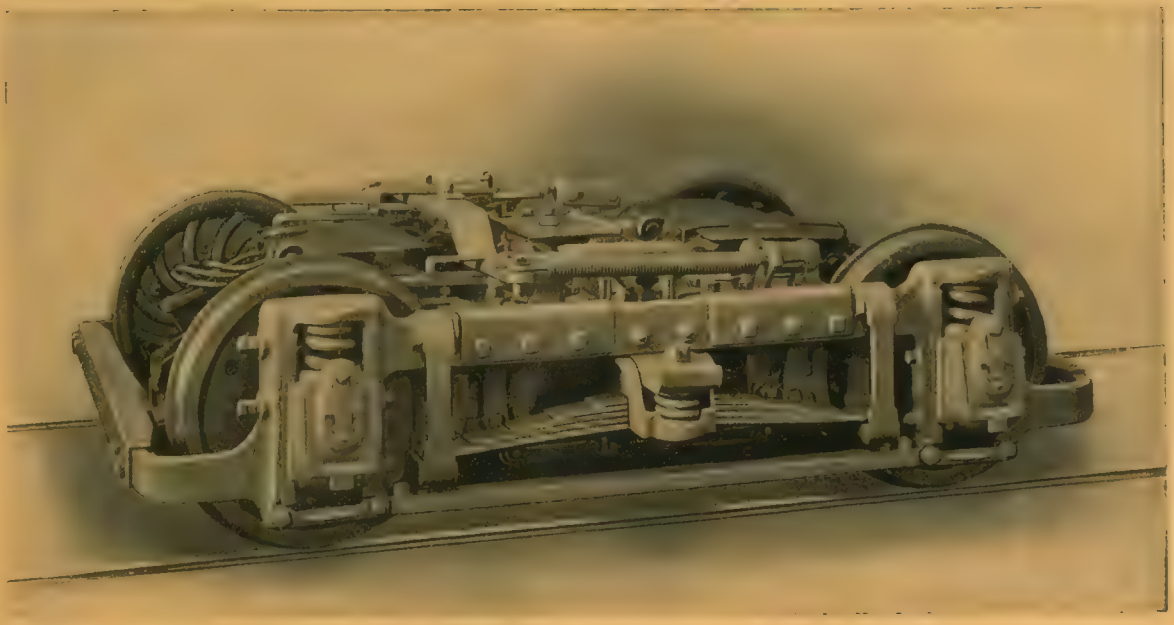
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BRILL 77-E TRUCK



"THE illustration shows the Brill 77-E type of truck adapted to operate with 22-in. and 24-in. wheels and small inside-hung motors. The Brill solid forged side frames have very distinct advantages in this compactly constructed truck. Note the wide gusset plates which are depressed inside the side frames to carry the transoms low. Double-corner brackets give extra reinforcement to the transom connections. Extra clearance gained by the low end extensions and end frames is another apparent advantage. The ability to arrange the spring system to best advantage without being hampered by frame trussing and also to enable swing links to be placed at wide apart points on the frame is another feature afforded by the solid forged side frames. This spring suspension gives superior riding qualities to the truck and the combination of plate and coil springs graduates the spring action for light and heavy loads. In this particular truck for low carried cars, two coil springs are used under each end of the bolster in a spring seat which straddles the semi-elliptic spring and thus economizes space. The Brill Graduated Spring System means that the bolster coil springs are automatically put in action under light loads."

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The twelve G-E trans-continental type locomotives now building for the Chicago, Milwaukee & St. Paul Railway mark a decisive step in the electrification of steam roads.

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Each locomotive weighs 260 tons and is equipped with eight G-E motors having a rated capacity of 3000 HP. continuously and 3440 HP. for one hour.

High Voltage Direct Current

These locomotives will be operated at 3000 volts direct current.

Trans-Continental Service

The initial order for 12 G-E locomotives is for the first division of 113 miles between Three Forks and Deer Lodge, Montana. Three more engine divisions will be electrified in the near future and complete plans cover main line electrification to the Pacific Coast.

The selection of the General Electric Company's high voltage direct current equipment for a project of this magnitude is a significant commentary on the past performance of G-E high-voltage direct current equipment.

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